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FAMILY FARMERS AND MANIOC IN CONTEMPORARY BRAZIL:

THE MANAGEMENT OF AGROBIODIVERSITY AND CHANGE

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DECLARATION

I declare that this thesis has been composed entirely by myself (except for citations duly acknowledged) and that it has not been submitted in any other previous application for a degree.

The photographs were also all taken by myself.

Patricia Gillian Stocker
Edinburgh
January 2006

DEDICATION

In loving memory of my Mother,
Christian Eileen Mary Stocker (née Poole).

ABSTRACT

Manioc (*Manihot esculenta* Crantz) is a staple food in the North and NE of Brazil and is the main crop and source of sustenance for many thousands of small-scale family farmers. It is native to Brazil and has been cultivated and adapted over thousands of years by indigenous peoples and small-scale farmers. Some 500 million people in the tropics of the Americas, Africa and the Far East currently rely on manioc as a staple crop for their daily energy needs.

The study focuses both on farmers' *in situ* maintenance of agrobiodiversity and on their management of change across the whole sequence of the production both of the manioc crop and manioc foods, and of the distribution, exchange and consumption of the foods ('the Manioc Chain'). It further analyses the contrasting systems whereby manioc is classified and named by farmers and agronomists by reference to the manioc varieties cultivated in four case study sites. Much of the specialised literature on agrobiodiversity – along with global debates about food security and rural development – deals only with the specifically agricultural practice of growing food crops. This literature omits consideration of the other elements of the Manioc Chain and only rarely draws on the type of ethnographic and ethnobotanical literature that provides the historical and cultural framework for this research.

Four case studies of manioc farming communities were conducted over a period of nine months – two in Pará and two in Bahia. The approach to this enquiry is farmer-centred and interdisciplinary. Empirical findings are based on interviews and visits with about 60 farmers, agricultural extension agents in the four sites and other agricultural professionals and numerous group and family discussions.

The findings are complemented by a tabulation of the characteristics of around 214 varieties as a contribution to the ethnobotany of manioc. The findings demonstrate that the loss of genetic diversity in manioc tends to be in inverse proportion to the proximity of the community to large urban centres. There remain expert farmers who cultivate diversity for cultural and not just for economic reasons. The creativity of these farmers and of their families, as producers of manioc foods, arises within dynamic local food

cultures. It is highly responsive to local market demand. Yet, even so, many aspects of the culture of these rural communities go unrecognised by professionals.

A change of thinking will be necessary if the *in situ* conservation practised by many small farmers is to continue and not to be eroded. The economic preoccupations of agricultural professionals are rarely matched with any parallel interest in the on-farm conservation of agrobiodiversity. Farmers' understanding, perceptions and management of manioc diversity exist in a separate realm. There is a disparity of outlook. The professionals want to help the farmers to adopt modern practices and to grow high yield varieties. Yet farmers' motivations go wider than this. They manage many varieties of the crop for reasons that include minimising disease and pest infestations, ensuring soil quality, producing diverse manioc foods to satisfy different tastes and cultivating varieties that they find 'pretty' or unusual.

The research analyses all stages of the Manioc Chain. This broad scope provides the conceptual basis for the finding that farmers adapt to externally induced change strategically by changing their practice in any one – or in a combination – of the several aspects of the Manioc Chain. In doing so, the farmers draw upon local knowledge which varies significantly between localities while also learning from external agents.

The study concludes by arguing for a change in thinking of the professionals as to the *framing* of and the *approach* to the issue of retaining *in situ,* on-farm agrobiodiversity for the benefit of the farmers and for those whom they supply. Agrobiodiversity in manioc is a vital resource for future generations that once lost can never be replaced.

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This is a time to remember the selfless generosity of so many people, my friends, colleagues, hosts and sometimes mentors.

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GLOSSARY OF PORTUGUESE TERMS

Água de mandioca	The waste water expelled from grated manioc during the process of making farinha. (Synonymous with manicueira and manipueira).
Aipim	'Sweet', non-toxic manioc. (The same as 'macaxeira')
Assentamento	Legal settlement of landless people
Aturá	Basket used, lined with banana leaves, for carrying farinha. Term used in Pará.
Beijú	A kind of flat manioc bread, pancake or biscuit-like snack made from starch or grated manioc and starch.
Biscoito	Crisp, puffy, light snack made from manioc starch and other ingredients. Considered typical of SW Bahia.
Caetitú (or Caetetú)	Cylindrical, metal, perforated device which, when rotated (by hand or by motor) grates raw manioc roots.
Casa de farinha	Farinha house. Place in which farinha is made. As this term is understood throughout Brazil, I use it as a generic term, despite local variations.
Casa de rodo (or Ca' de rodo)	Synonymous with casa de farinha. Term used in SW Bahia.
Cocho	Hollowed-out wooden bench, usually long, used to carry out a number of actions relating to the processing of manioc eg. grating, washing, resting farinha.
Enxada	Long wooden-handled, steel-headed tool (sometimes referred to as a 'hoe') used for many different tasks in the field from removing weeds to digging up plants and making a hole in which to plant.
Farinha	Manioc 'flour', consumed with other foods or dry, on its own.
Farinheira	Rural industry manufacturing farinha

Forneiro	The man who is responsible for moving the farinha around on the forno whether manually or mechanically. By stoking the fire to the right temperature, and adjusting the speed of the manual or mechanical stirring around of the farinha, he is responsible for an important aspect of the quality of the final product.
Forno	Griddle used for toasting farinha. It may be made of copper, iron, stone, clay or ceramic. The same terms is used for the complete structure on which the griddle rests and in which timber burns. The word also means oven (see photograph on page 170 (top) for example.
Goma	Fine manioc starch. For a more detailed explanation of different types, please see Table 7-2 (page 178).
Macaxeira	'Sweet', non-toxic manioc. (The same as 'aipim')
Mandioca	Manioc, the generic term. Usually refers to the 'bitter', toxic varieties.
Manicueira	The waste water expelled from grated manioc during the process of making farinha. (Synonymous with manipueira and água de mandioca)
Manipueira (or manicueira)	Liquid effluent expelled from grated and/or soaked manioc when squeezed dry in a tipití or pressed in a wooded press.
Manipuera	The waste water expelled from grated manioc during the process of making farinha. (Synonymous with manicueira and água de mandioca)
Paraense	Native or very long term inhabitant of Pará, possibly with indigenous blood. The term is used to distinguish these people from incomers, especially from NE Brazil – and also from urban people.
Podridão	Root-rot. One type affecting Capim was Pytophthora drechsleri.
Queima	Leaf 'burn' caused by white fly. It is one of the following diseases.: Aleurotrachelus **sp,** Aleurothrixus **sp.,** Bemisia tubersulata and Trialeurodes variabilis
Quintal	Back yard or kitchen garden
Retiro	Synonymous with casa de farinha. Term used in Pará field sites.

Roça	Field of manioc (and other subsistence crops). Term used only by small-scale farmers.
Rodo	Long-handled paddle for stirring the farinha on the hot forno while it toasts.
Tipití	Long, narrow tube of woven natural material such as fibres or long leaves. Ancient device, still widely in use for the wringing dry of grated or soaked manioc roots.

ACRONYMS

ABAM	Associação Brasileira de Amidos de Mandioca Brazilian Association of Manioc Starch
CBD	Convention on Biological Diversity
CBN	Cassava Biotechnology Network
CEASA	Centro de Abastecimento Sociedade Anônima Supply Centre Ltd. (Central city market)
CIAT	Centro Internacional de Agricultural Tropical International Centre for Tropical Agriculture (in Cali, Colombia)
CIMMYT	Centro Internacional de Mejoramento de Maíz y Trigo International Maize and Wheat Improvement Centre
COOPERA	A rural development NGO based in Inhambupe (BA)
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária Brazilian Enterprise for Agricultural Research
EMBRAPA – CENARGEN	- Centro Nacional de Recursos Genéticos - National Centre for Genetic Resources
EMBRAPA – CNPMF	- Centro Nacional de Pesquisa de Mandioca e Fruticultura Tropical - National Centre for Manioc and Tropical Fruit Research
EMBRAPA –CPATU	- Centro de Pesquisa Agroflorestal da Amazônia Oriental - Centre for agro-forestry research for western Amazônia
ETC Group	Action Group on Erosion, Technology and Concentration
FAO	Food and Agricultural Organisation (of the United Nations)
FASE	Federação de Assistência Social e Educacional Federation for social and educational assistance (National NGO)
GEF	Global Environment Facility

GRAIN	Genetic Resources Action International
IPGRI	International Plant Genetic Resources Institute
ISA	Instituto Sôcioambiental
NAEA	Núcleo de Altos Estudos Amazônicos Nucleus for Advanced Amazon Studies (at the Federal University of Pará in Belém)
NGO	Non governmental organisation
PGRFA	Plant Genetic Resources for Food and Agriculture
PLEC	People, Land Management and Environmental Change
PRA	Participative rural appraisal
PRORENDA	National NGO
RRA	Rapid rural appraisal
STR	Sindicato de Trabalhadores Rurais Rural Workers' Union
UESB	Universidade Estadual do Sudoeste da Bahia State University of South West Bahia (in Conquista)

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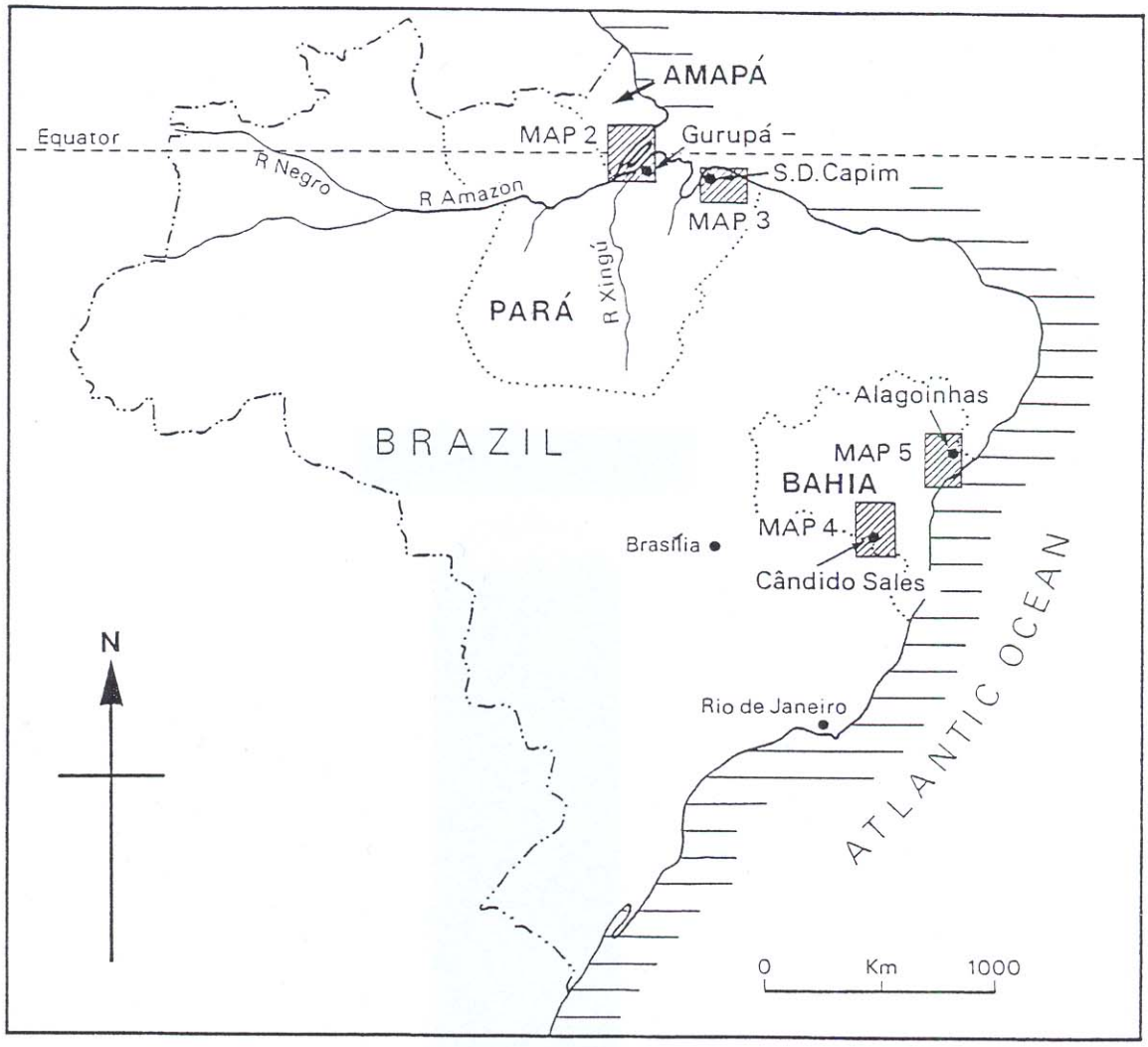
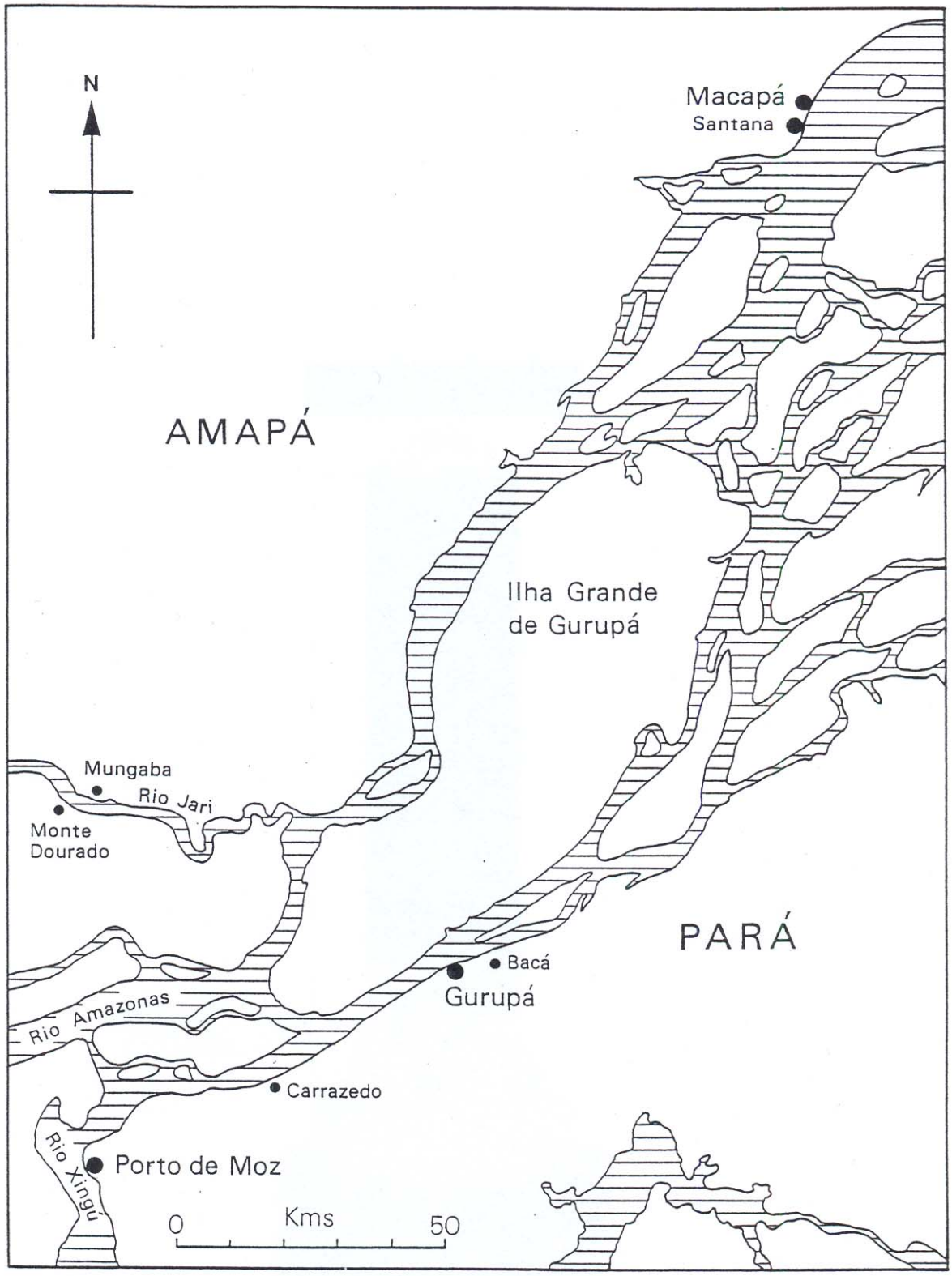


MAP 1: Brazil showing the four case study sites



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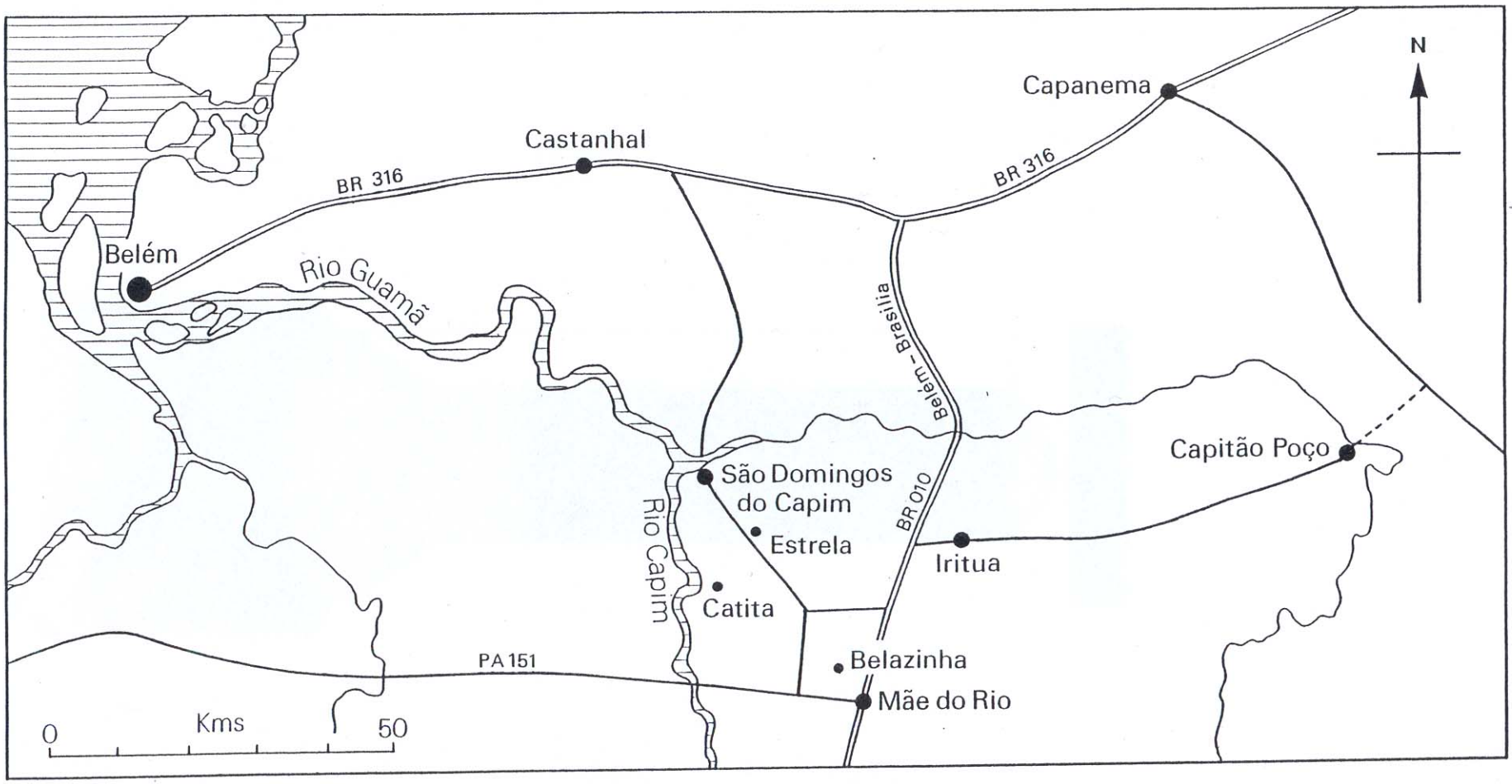

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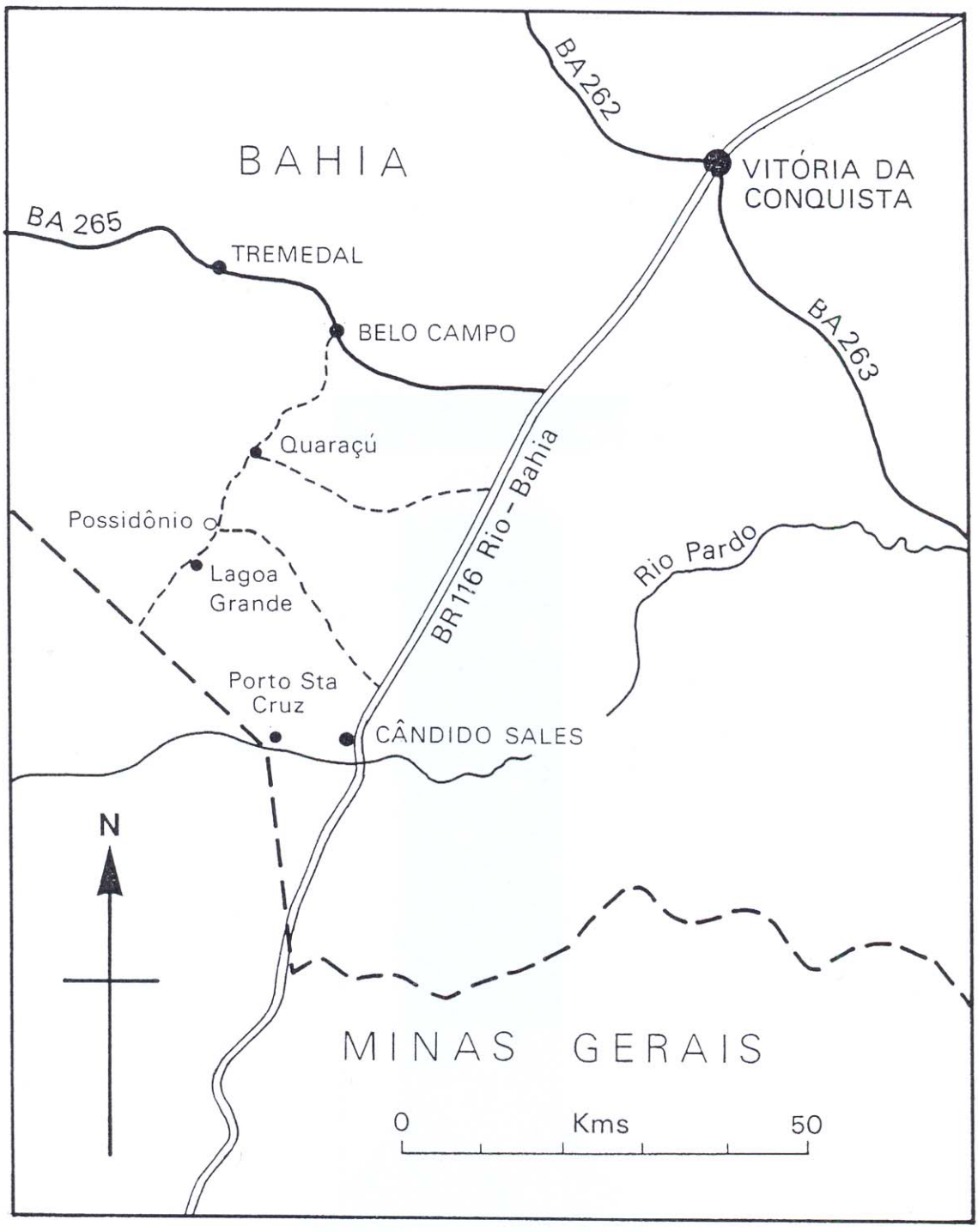

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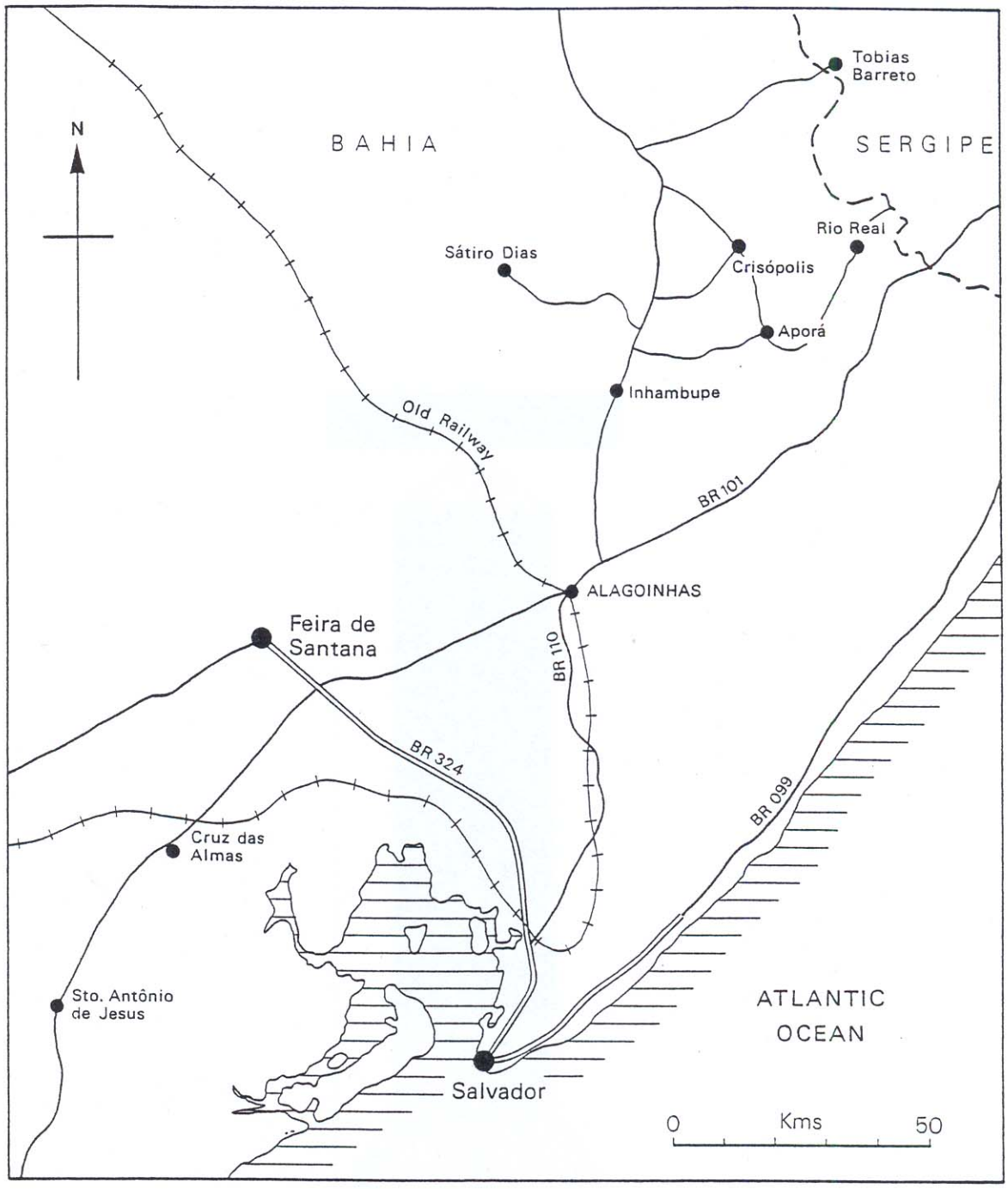

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CHAPTER 1

INTRODUCTION

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INTRODUCTION

> 'Agrodiversity may be helped to survive by its own resilient properties, but it would survive much more securely with stronger public backing. …the adaptive dynamism of agrodiversity is its most essential property for survival, let alone for restoration of what has been lost.' (Brookfield, 2001:286) [1]

I have chosen this observation by Harold Brookfield to set the tone for this research and to suggest the purpose and aim. My underlying purpose is to use this enquiry to draw attention to the nature of what is in danger of being lost in manioc, one of the world's major food crops. The survival of agrodiversity in manioc, in Brazil as in other tropical countries where it is a food staple, is in the hands of skilful and knowledgeable small-scale farmers. They provide food security for themselves and for millions of others among the rural and urban poor. To try and safeguard agrodiversity we must first try and understand what it is that the farmers themselves are doing to preserve it as an integral part of their own forms of agri-culture. This task of achieving an in-depth understanding of the farmers' practices should come first, before ever we consider the merits and demerits of the various professionally driven schemes for *ex-situ* and *in-situ* conservation.

Brookfield himself is a geographer turned sociologist and anthropologist and is the former principal scientific coordinator of the international People, Land Management and Environmental Change Project (PLEC). His work has been described as being 'on the borderlands between disciplines…between geography and anthropology, subsequently moving on to a broad but reasoned array of other disciplines: agronomy, ethnobotany, paleobotany and prehistory.' (Waddell, 1997) It is entirely appropriate that this study also should be multi-disciplinary in scope. The subject matter requires the bringing together of the insights of scholars from a range of different disciplines, some of whom themselves are boundary crossers.

In this introductory chapter I start with a brief presentation of the major food crop, manioc, which holds centre stage in this multi-disciplinary enquiry. I then go on to relate why I should have come to take an interest in it and in those who cultivate it. This leads on to an initial statement of the main issues addressed in this enquiry, the aim of the research and the

[1] Brookfield's definition of 'agrodiversity' is: 'the many ways in which farmers use the natural diversity of the environment for production, including not only their choice of crops but also their management of land, water and biota as a whole.' (Brookfield and Paddoch, 1994, see also Table 2 -1 in Chapter 2). My chosen term, 'agrobiodiversity', has the same significance.

research questions and then sketches of the four case study areas where I undertook the fieldwork. This chapter concludes with summaries of the content of the following eight chapters, leading to the conclusion in Chapter 9.

MANIOC: A BRIEF HISTORY AND THE MAIN CHARACTERISTICS OF THE CROP

Manioc, *Manihot esculenta* Crantz, is one of the five most important food crops of the world, along with maize, wheat, rice and potatoes. Although the precise origin of manioc, according to the Brazilian scientist Antônio Allem, 'has long eluded researchers' (Allem, 1999b), there is no dispute that this edible root crop has its origins in the South American tropics, most probably in Brazil. It was an essential food for the pre-Colombian indigenous peoples in the Amazon basin as also in the region that is today Western Brazil and Paraguay. It was cultivated by the Arawak people of Hispaniola, Cuba, Jamaica and Puerto Rico before Columbus arrived. It is from the Taino languague of the Arawak people that we have assumed the word 'cassava', which is commonly used today in the non-American anglophone and francophone world. The Tupí-Guaraní word *manió* is the origin of the term 'manioc' in American English and *mandioca* in Portuguese. [2]

Manioc was known only in South and Central America until the Portuguese took it to Africa, and later to India, in the 16th century. In post-colonial Brazil there is little doubt that it was one of the most important subsistence starch foods for the majority of the population. According to Pinto de Aguiar, author of the authoritative history of manioc in Brazil (Pinto de Aguiar, 1982), the earliest reliable known written mention of manioc was made in 1519. The chronicler was the Italian, Francisco Antonio Pigafetta, who accompanied the expedition of Fernão de Magalhaes in that same year, landing in the Baía de Guanabara, the bay on which Rio de Janeiro was subsequently built. At that moment, nearly five hundred years ago, the native inhabitants were making *farinha* – toasted manioc flour. The Portuguese and those who travelled with them spoke highly of *beijú*, the bread that was made from manioc, describing it as most useful and very good, even as good as the bread they knew from Europe. In colonial times manioc was important not as a cash crop but as a reliable food. Today it is a staple food for around 500 million people in the tropical world and is one of the four most important suppliers of calories with rice, sugarcane and maize. (Cock, 1985) Today African countries produce 52.93% of the world's manioc, Asia produces 29.87% and

[2] Botanical scientists, writing in English, use the term 'cassava' to signify the edible species of the genus, *Manihot esculenta.* (e.g., Antônio Allem, the Brazilian scientist). The hispanic term, *yuca*, also originates in the Taino language. *Yuca* referred to the plant while *casabi* referred to the bread made from *yuca*, which is the equivalent of Brazil's *beijú.* The plant known to us in English as *yucca* is botanically unrelated to *Manihot* - it is from the family Agavaceae.

Latin America and the Caribbean 17.20%. Brazil's share of the Latin America and Caribbean production is 72.11%. (FAOSTAT, 2004) [3]

Brazil's manioc was never as highly prized by the Europeans as were other agricultural commodities such as sugar, cotton and coffee from which fortunes were made, although it did prove invaluable to the colonists in north-east Brazil, as well as in Africa, as food for slaves. (see Hubert and Dupré 1910 and Jones, 1959). Valeriano (1954) recalls a dictat of 1686 from *El Rei* in the City of Bahia (now Salvador and then Brazil's capital) by which slaves were obliged to plant 500 manioc plants per head, per year. The law made special mention of slaves working on sugar plantations or planting tobacco, especially those who lived within ten leagues of the city. The penalty for the *Senhores* or planters who disobeyed would be fifty thousand *réis* and two months prison. Moreover, free labourers were forbidden to abandon the production of *farinha*. Manioc was so important for the physical survival of the slaves, of their masters and of others that the authorities felt that they needed to guarantee its regular supply. The great irony of this seventeenth century story is that today manioc, once such a useful food for slaves both in Brazil and Africa, is still considered by many to be the food of the poor - the food of black people. Perhaps this is because, unlike some of the other great world staples, it cannot be cultivated in the richer metropolitan countries of the Northern Hemisphere. For many, scientists and consumers alike, manioc and manioc foods are still low in social status and economic importance. [4]

The genus *Manihot*, of which *M. esculenta* Crantz (manioc) is the cultivated, edible species, is of the Euphorbiaceae family. There are thousands of recorded varieties or cultivars of this species. [5] The principal *ex-situ* collection of manioc is held in Colombia at the International Centre for Tropical Agriculture (CIAT). CIAT holds a total of 8,060 accessions, 5,728 of which are held in-trust for the 'international community.' (Koo *et al.*, 2004).[6] Brazil's official Agricultural Research body, *Empresa Brasileira de Pesquisa Agropecuária*

[3] Statistical tables are to be found in Appendix 2. Appendices 2C-G relate to manioc production in Brazil and in the States of Pará and Bahia.
[4] The production of manioc starch by the industries of southern Brazil are beginning to alter this status. Certain products, especially modified starch, are now competing with maize starch products that are widely used globally. However, on a lighter note, according to a UK-wide survey, 'Frogspawn' tapioca was officially [voted] Britain's most hated school dinner.' (Edinburgh Evening News, 6 August, 2003)
[5] The sources for this and the general characteristics of *Manihot and Manihot esculenta* Crantz are Rogers and Fleming, 1973, Rogers and Appan, 1973 and Cock, 1985 unless another source is cited. This account is also informed by my own field findings.
[6] Gene banks are required to hold germ plasm in-trust 'for the international community under the auspices of the Food and Agricultural Organization of the United Nations.' (Koo *et al.*, 2004)

(EMBRAPA), which holds the main collection of manioc germ plasm for Brazil, was holding 1641 accessions in 1997. (Fukuda, 1997)

Manihot, which is usually classed as a shrub - although sometimes as a herb or weed - can vary quite considerably in appearance even within the one species *M. esculenta*. The leaves of most manioc varieties have between 3-9 lobes and are obovate in shape. Stems are usually brown or silver coloured and scarred, commonly with two or three lower branches. Most cultivars are between one and three metres tall when mature. Some wild (non-edible) species are much taller, growing to a height of four metres or more and have the appearance of trees. The external root can be rough or smooth, and is brown, pale brown, dark brown or reddish brown. The flesh of the root is popularly classified in Brazil into three main colour groups: cream, white and yellow. The shape and length of the tuberous, elongated roots vary considerable between varieties but today tend to be harvested when around 30-50 cms. or a little larger. The leaves, although not commonly consumed in Brazil by humans other than in the State of Pará, despite the fact that they are rich in vitamins A and C and iron, are nevertheless widely appreciated in West African countries. [7] All parts of the plant contain varying degrees of poisonous hydrocyanic acid (HCN) although the roots of varieties commonly referred to as 'sweet' (*macaxeira*, *aipim* or *mandioca mansa* in Portuguese) can be consumed without removing the HCN. All 'bitter' varieties require processing to remove the HCN.

In South and Central America and the Caribbean the crop is cultivated in the lowland and humid tropics and also in areas with a pronounced dry season where the mean temperature is around 25 degrees Celsius. It is known in the Colombian Andes at altitudes as high as 2300 metres and is also found in acid, infertile savanna areas and areas of the tropics with a cool winter season. It will not withstand frost. Manioc can grow on poor, sandy soils - oxisols, ultisols and inceptisols - but must be well drained. Water-logging and flooding kills the plant. This explains the limited genetic diversity of manioc present in traditional communities in the Amazon *várzea* or floodplain where varieties that mature in six months are the only ones normally cultivated. It usually grows best in areas with a rainfall of between 1000-3000 mm. p.a. where the rain falls immediately after planting. After this initial period, it can be extraordinarily resistant to long periods of drought.

[7] The dried leaves are a vitamin-rich component of a powdered food supplement that has proved to be highly effective in the treatment and rehabilitation of malnourished children. This product, *multi-mixtura*, is promoted by the Catholic Church in Brazil (the Pastoral Committee for Children – CPT) and can be – and is - easily made by farmers at home. Otherwise, the leaves are rarely consumed.

One of the most useful characteristics of manioc is that the roots of many varieties can be *de facto* stored in the ground before harvesting for many months after maturity. (see Appendix 9) The crop cycle varies according to climate, the culture of the farmers and the particular cultivar but for most of these the range is from 6-24 months. The more negative aspect of the plant is that it cannot survive in its natural state for more than two or three days once it has been harvested, so in most cases it is processed before marketing. In this way the crop is quite different from maize, that other historically important subsistence plant of the tropics. In contrast to manioc, maize must be harvested at a given time and yet can be stored relatively easily for long periods.

Farmers propagate manioc by planting a short stem-cutting. Farmers do not plant seeds. Under the right conditions, the cutting begins to sprout after about two to three weeks.

THE ORIGINS OF THIS PROJECT

My own awareness of the significance of manioc in South America was first awakened during a succession of visits in the early 1980s to some of the villages of the Aguaruna and Huambisa people of the Upper Marañón in the Peruvian Amazon. Here the women would make *masato*, an alcoholic drink, by chewing manioc and spitting it out into earthenware pots where it was left to ferment for at least 24 hours before being served to men-folk and to visitors. Alternatively, a carefully chosen root would be roasted on an open fire and offered to family and guests alike. Several years later, as I was working in Brazil with a UK-based development organisation, I travelled widely in the interior of the Amazon and the north-east where I learned to appreciate the various regional foods of manioc as well as the many different colours and textures of *farinha*, the omnipresent manioc flour. Many a meeting was held in *casas de farinha*, the village houses in which the *farinha* is made. During these visits I was able to observe the skill of the man who shifted the *farinha* as it was toasting on enormous griddles and note the good humoured labour of women and children as they peeled the roots or hauled them out of the river, or from an old canoe, where they had been soaking. The *casa de farinha* frequently served as a community meeting place during the day in both indigenous and non-indigenous communities.

I learned to take for granted the presence of manioc and *farinha* in Brazil. It was not until I had occasion to work in Mozambique after the war in 1993, and later in 1994, that I realised, rather suddenly, how deep was rural people's knowledge of manioc in Brazil and how varied were the uses to which it was put. Manioc is an important subsistence crop in Mozambique as well, but the roots being harvested in some of the places I visited were very small and Mozambicans make neither *farinha* nor *beijú.* The comparison with Brazil and Peru seemed

to be quite stark. I later learned how interesting is the manioc culture in Sub-Saharan Africa, especially in West Africa where it plays such an important role in the food security of many countries. However, at that time it seemed to me that Brazilians' knowledge of manioc and manioc foods was greater.

My particular interest in agrobiodiversity, coupled with this curiosity about manioc and the cultivators and consumers of manioc, led me to undertake this research project during a period of intense international debate and protest around some of the global issues involved. The mid-to late 1990s was a period of mounting international protest against the power of the multinational seed corporations. It was also a period during which there was a flourishing of alternative visions expressed for promoting farmer-lead projects and programmes aimed at the conservation and improvement of basic crops.

THE ISSUES

The issues addressed by this research are local to the regions of Brazil where the enquiry was carried out but they are global for Brazil and for those regions of the world where small-scale farmers cultivate manioc – or indeed other crops – for family sustenance as well as for the local market. According to a senior scientist in EMBRAPA, the average farmer in north-east Brazil was cultivating 15 varieties of manioc in 1978. By 1998 that figure had dropped to only two. [8] The manner in which small-scale farmers manage agrobiodiversity is an issue of global concern. In FAO's own estimates, '…more than 90% of crop varieties have disappeared from farmers' fields in the past 100 years and agricultural plant varieties are continuing to disappear at 2% a year'. (ITDG, 2002) One of the important questions facing the world today is how to arrest this decline in genetic resources for agriculture. A parallel question is how to ensure that those men and women who sustain this diversity, in their own interests and in the interests of future generations, can be encouraged and supported from the outside so that this decline can be reversed.

Brazil is the fifth largest and fifth most populous country in the world and immense in its diversity - of climate, terrain, natural resources, ethnicity and settlement patterns. The balance of the population of 170 million (2000 Census) has shifted until today it is massively urban. Average income, which places Brazil amongst middle-ranking countries in terms of

[8] C. Fukuda, EMBRAPA-CNPMF – personal communication, 1998. Fortunately, my findings suggest that Fukuda's observations are over-pessimistic. However, they do reflect a loss in agrobiodiversity in manioc which my findings from the case study areas confirm. Fukuda's observations may have been mainly centred on areas in which agricultural experiments had been carried out or where extension agents had introduced some 'improved', high yield and/or pest and disease resistant varieties from the outside. Such varieties are sometimes developed in EMBRAPA's research station – and their introduction can lead farmers to abandon older, locally known varieties. (see Chapter 6)

development, is highly misleading since the figure masks the reality of one of the world's most unequal societies. This inequality is steadily growing. The poorest 20% receive 2% of the income share. The richest 20% of the population receive 64%. (Patel and Cassel, 2003) Poverty is the backdrop to any study such as this although the actual lived experience varies, between states, from rural to urban neighbourhoods and within all of these. There is no identikit 'poor Brazilian'.

Poverty cuts deep for large numbers of the rural population, not least in their access to land. Thus 40% of farmers share 1% of the land while the richest 20% own 88%. (Patel and Cassel, 2003: 17) [9] Government policies, including agricultural policies, tend to favour better-off Brazilians. In the era of neo-liberal policies, which have been embraced by successive Brazilian governments, the beneficiaries in the countryside have tended to be the richer agricultural producers, notably in soybean and maize production. Yet, despite this and despite the penetration of other food crops into urban and rural markets, manioc continues to be the 'traditional food crop' *par excellence*. Despite some scaling down over the last ten to twenty years, it remains enormously important in the provisioning of rural and urban food markets and most especially amongst the poor.

Like other countries, Brazil since the 1960s has seen the growth of a specialised agricultural sector that has concentrated on a few uniform varieties that need external inputs, notably chemical fertilizers and pesticides, and that then deliver high yields - measured by input/output ratios. As farms come to specialize so they become more capital intensive, more dependent on mechanical and chemical inputs, and they become larger. This process, strongly advocated by donor countries in the 1960s, has been justified as a response to hunger in poor countries. It has indeed led to increases in agricultural productivity and food production - much of this going to the mushrooming urban populations and for exports. Yet it has been accompanied by persisting hunger and poverty. Many traditional cultivars have been lost. The process has led to the redirection of resources away from subsistence crops (such as manioc, beans, rice and maize) towards cash crops. It has had such diverse effects as the reorientation of agriculture towards external trade, the creation of a huge agribusiness sector, the consequential displacement of an estimated 28 million small farmers from the land as a result of government policies between 1960 and 1980 and the incursion of many of these same displaced farmers into the Amazon region with devastating ecological effects.

[9] These are 1998 figures. There are significant correlations between the incidence of poverty, access to land and race and gender, with women and people who are classified as black more likely to be poor. The north-east, which is Brazil's poorest region, is predominantly black.

(McMichael, 1996:72) Another negative effect is the deskilling of the reduced numbers of farm labourers who work on the massive new farms.

By now the modernisation process is far advanced and is moving on from the science-based agriculture of the 1960s and 1970s to the new science of biotechnology. Despite warnings from independent scientists and campaigners, the Brazilian federal government has now legalised genetically modified crops (GMOs). [10] This was done under converging pressures, on the one hand, from such transnational companies as Monsanto and, on the other hand, from large-scale producers, especially in Rio Grande do Sul, who have been pirating GMO seeds for the soybean crop. This, which is the main farm export, accounts for 10% of Brazil's total trade revenues. (Reuters News Service, 1 March 2005)

As we shall see, it is the agronomists as agricultural scientists - a category that includes extension agents amongst their number - who are the most influential advisers to small farmers in coaching them `in the imperatives of agricultural modernisation and of the market economy. In their formal training and practical orientation Brazilian agronomists are expected to respond to these imperatives and, indeed, to try and overcome the perceived disadvantage of Brazil in terms of science-based agriculture.

> 'Modern agriculture requires a strong technological background and countries must purchase both equipment and technologies to compete. The direct result on farmers is the requirement to produce at lower costs to compete in the international market. This is certainly a major challenge for the graduates in Agricultural Engineering.' (Cortez, Nääs and Braunbeck 2001: 3)

If we consider the issues from the small farmers' point of view, we can see that the agricultural biodiversity of manioc has always depended on the interaction between the crop and indigenous people and 'traditional' farmers, within their particular geographical and cultural landscapes. The indigenous peoples of the Americas have selected and developed varieties of manioc for their own use and according to their own criteria over a period of between ten and twelve thousand years. This is the inheritance of the farming families that are the subjects of this research. Those who manage the crop in thousands of small farms in Brazil today are the people who are sustaining a wide genetic variation in the crop.

The thriving local and regional markets in *farinha* and other manioc foods ensure that the poorest sectors of the big cities and the population of small local towns are well provisioned with one of their most important foods. These markets are supplied by family farmers in the

[10] The *Lei de Biosegurança*, which legalised GM crops (among other things), was published on 28 March, 2005 and passed by Congress

areas of my four case studies and elsewhere. Most of the family farmers in my study were also amply supplying their own extended families with *farinha*. Much of this important, changing local activity goes unrecorded by the agricultural surveys and is scarcely and at best inaccurately reflected in agricultural censuses. There have been few studies of this realm of activity in Brazil which, in this enquiry, I refer to as the Manioc Chain - the production of the crop and of the foods and their distribution, exchange and consumption. Given the flexibility and creativity of family farmers, the most urgent and appropriate focus for the study has been on the ways in which these people adapt in a rapidly, sometimes cruelly, changing economic and political environment. However, the farmers are not only agriculturists. They are also the people who process this toxic root, create food from it and bake or otherwise cook the starch products and liquids derived from it. They are also the traders and consumers of this food that is so central to their lives. There has been little published about the very people who are the custodians of the agricultural biodiversity in manioc. The important exceptions are in those ethnographies and ethnobotanical studies of the relationship of the indigenous people of the Amazon to manioc. Much can be learned from this research. This study builds on this body of work, extends it to the state of Bahia in north-east Brazil and incorporates some new concepts to the approach – all of which is discussed in Chapter 2.

THE RESEARCH AIM

The aim of this research is to investigate to what extent, if indeed at all, is there a decline in agrobiodiversity in manioc in the north and north-east of Brazil. This research is conceived of as a contribution to addressing the question of how to reverse the decline of genetic diversity in manioc and its accompanying knowledge base. Central to this enquiry are the men and women who sustain and develop this diversity in their own interests and in the interests of future generations as well as in the universal interest. However, these farmers are an integral part of a complex and evolving national and global culture and economy that impacts on them and upon which they too have their impact. Therefore, if they are to be enabled to reverse the decline in agrobiodiversity in manioc, 'stronger public backing' will be needed for this work, as Harold Brookfield argues above. (Brookfield, *op. cit.* at the head of the chapter)

THE RESEARCH QUESTIONS

The enquiry has been organised around the following four questions:

1. In what way is agrobiodiversity in *Manihot esculenta* Crantz (manioc) important for family farmers and for others in Pará and Bahia in Brazil?

2. In each of four case study sites how many varieties of manioc are currently being cultivated and how many have been cultivated within living memory? Has there been any loss in agrobiodiversity in manioc within living memory and, if so, why?
3. Has there been any erosion in the knowledge base regarding manioc among the populations who produce, consume and market or otherwise distribute manioc and its products? How has this population changed its practices and developed its products of manioc in order to adapt to new life styles and preferences and to the changing economic environment?
4. How do the research findings contribute to a deeper understanding by agricultural and rural development practitioners and researchers of the significance of agrobiodiversity in a single crop?

THE CASE STUDY AREAS

The methodology for addressing these questions is the subject of Chapter 3. A case study approach was adopted and the research carried out in four rural areas, two in the Amazonian State of Pará and two in the north-eastern State of Bahia. (see Map 1) There were two main reasons for the selection of these states as a location for the fieldwork. First, they were two of the three greatest producers of manioc in Brazil according to the agricultural census of 1995-6. (See appendix 2G for statistics) Paraná in southern Brazil, with its industrial-scale production, was first in the league, but Pará and Bahia are both very old producers of manioc. In both states the culture of manioc is old and deeply rooted. The food cultures are different and present an interesting contrast. Manioc-based foods and *farinha* in Pará are derived from indigenous cultures whereas in Bahia the food culture in the north of the state is influenced by African food culture. In contrast, in the south-west the food culture shows signs of adaptation to the influences of European colonists.

The reasons for selecting each of the four case study sites are explained in Chapter 3. Manioc is central to the lives of the small-scale farmers in each one of these areas.

Gurupá, Pará (Map 2)

The municipality of Gurupá, the first site visited, had a population of 23,098. [11] The town lies on the Amazon and had a population of 6,593. Gurupá town can only be reached by boat or in a small plane – there is no road linking the municipality to the rest of the country. The people are variously of indigenous, Portuguese and black, escaped slave descent. The

[11] Population figures are from the 2000 Census published by IBGE, the official Brazilian statistical institute.

people of the community of Bacá, where I undertook my fieldwork, are *posseiros*. The term, explained by Deborah Lima (2004) in another context, is identical in the Gurupá context:

> '..land tenure is based on land-use rights held by residents and their relatives. … their traditional model of land tenure is based on a notion of collective 'ownership' of the community's territory and operates in association with the right of exclusive land use rights of plots of cultivated land.' (Lima, 2004:13)

Farmers normally cultivated 2 *roças* (fields) per year of between 1-3 *tarefas* (1 *tarefa*=0.33 has). Apart from 'sweet' and 'bitter' manioc, farmers also grew pineapples, cará and sweet potato. Some grew beans and squashes. The forest provided a wide range of fruits, the most valued of which, for domestic consumption, was *açaí* (*Euterpe oleracea)*.

At the time of my fieldwork in 2002, the municipal government was headed by the *Partido dos Trabalhadores* (PT), the Workers' Party. The rural workers' union (STR) and FASE, the non-governmental development organisation that had facilitated my introductions within the municipality, worked in close association with the local government. The community of Bacá was only around half an hour's bus journey from Gurupá town along a dirt road and most Bacá residents, all of whom were farmers and extractivists (except for the primary school teacher), had family members living in the town. Several of the younger people owned bikes with which they would travel back and forth. All Bacá families owned one or more small canoes with which they travelled around the interior streams of the area and occasionally along the shoreline of the Amazon. A twice-weekly bus service enabled Bacá farmers to travel to town with produce for sale and to return home having made their necessary purchases. Although travel to and from town was easy during the summer months, I was informed that the road was not always passable during the rainy season. Bacá had no mains electricity and no telephone.

A small chapel and a secondary school building, behind which there was a football pitch, marked the centre of the community. The community leaders and the primary school teacher, who was resident, had all been educated within the 'liberation theology' ideals of the Catholic Church where they had learned the values of solidarity and self respect. They had also learned organisational skills. The weekly Sunday celebrations in the chapel, as well as the several local festas, were all occasions for community gathering, discussion and planning. The community was well-organised and had a strong voice in the STR and easy access to local government.

São Domingos do Capim, Pará (Map 3)

Capim town is situated on the confluence of the rivers Guamã and Capim. The population of the municipality was 27,405 and of the town - smaller than Gurupá - 5,877. Both road and river transport are vital to the economy of the municipality and facilitate mobility throughout the area as well as to and from both the large town of Castanhal, to the north, and the metropolitan area of Belém. Belém and neighbouring Ananindeua had a combined population of 1.67 million. The municipality was divided into four main economic-ecological zones: river bank, mixed zone, east zone and high area.

The people of Capim are a mixture of second and third generation migrants from north-east Brazil and people, whose roots are deeper in the area, known as *Paraenses* (Pará people). Most probably they are descendants of black and indigenous people and of Portuguese colonists from the 18th century onwards. I was unable to locate any ethnographies of this region to confirm this impression. These two elements of the population had different attitudes to agriculture as well as to the market. The north-easterners tended to be more 'business' oriented than the *Paraenses*. The earlier indigenous population of this area seems to have been eliminated during the twentieth century although, again, little precise information was available about this dark chapter of local history.

According to a participative survey carried out in 2001 (PRORENDA Rural *et al.*, 2001), most farmers were using between 2-10 *tarefas* (0.66 to 3.3 has.) for their crops, depending on their relationship to the land and on the zone in which they lived (although some farmers owned more land than they used at any one time). As well as small proprietors there were also *posseiros* (as in Gurupá) and others who either rented a small plot of land or who worked as sharecroppers. Manioc was by far the most significant crop but some farmers also cultivated a small quantity of beans, rice and/or maize. Those few farmers who grew some cash crops grew bananas, cocoa, black pepper and passion fruit. There were a number of large cattle ranches in the municipality and a few farmers kept a small number of head of cattle. The surviving forest was also a source of fruits and nuts.

At the time of my fieldwork, the municipal government was headed by a progressive, dynamic mayor assisted by a progressive 'cabinet'. The rural workers' union (STR) was well networked and had a strong presence in the municipality. There were 15 farmers' associations in the municipality that were either established or in formation and which were invited to meet regularly with the Secretary for Agriculture in Capim town. All the communities that I visited had some form of organisation, whether in the farmers' associations or in church communities (Catholic and Assembly of God, especially).

All of the rural people whom I met had some connection with Capim town and/or other towns in neighbouring municipalities. Some had family in Belém. The public transport that did exist within the municipality was precarious but functioned on market days (twice a week) to enable farmers to bring their produce to market and to shop. As distances were quite great, rural people tended not to travel by other means to town although some owned bikes. River traffic was important, however, and those living near to rivers owned small canoes for local travel.

Cândido Sales, S.W. Bahia (Map 4)

The municipality of Cândido Sales in SW Bahia had a population of 28,516 of which 66.4% were registered by the 2000 census as 'urban'. The populations of the very small towns of Quaraçú and Lagoa Grande are included in this figure along with the population of the municipal capital, Cândido Sales. Cândido Sales town is on the main Rio-Bahia highway which links Rio de Janeiro with Salvador and is about 85 kms. from Vitória da Conquista. Conquista, as it is known, is an important regional centre and the third city of Bahia with a population of 225,545.

No base-line studies were available in this area, so the following information is approximate. The population of this area is predominantly white or descendants of white and indigenous people, in contrast with northern and coastal Bahia where there is a much stronger presence of Afro-Brazilians. Many, even most, families in this area have relatives in São Paulo where many sought work in past decades and others continue to do so. The area is ecologically similar to the larger *caatinga*, semi-arid land of thorn scrub, but is more precisely defined locally as *mata de cipó* (vine forest).

As Cândido Sales is one of Bahia's largest producers of the crop, manioc farming is clearly dominant, along with cattle ranching. Small-scale family farmers grow a very few other crops for family consumption such as beans and a little maize. Many farmers own or rent their land, unlike in the Amazonian case study sites where most farmers are *posseiros*. It is estimated that most farms are less than 2 has. although some may be as large as 10 has.

The municipal government at the time of my fieldwork appeared to be interested in the economic development of the municipality but there was little evidence of their being actively interested in the situation of small farmers. The Rural Workers' Union (STR) appeared to be politically divided and its presence was weak in Quaraçú, where I was based. Despite the fact that 14 Farmers' Associations were registered, they appeared to be weak and inactive. There were more than 10 different types of church in the small town of Quaraçú.

This meant that the Catholic Church, once dominant in the rural areas, was so no longer. A single, dynamic Catholic priest, based in Cândido Sales, cared for this and the neighbouring municipality of Encruzilhada with very little support. There were no development 'projects' of any kind that I became aware of during my stay in the area. As a result, the level of organisation of local people was very low.

A network of buses provided a basic level of public transport both between the small towns and villages of the municipality and to Conquista. All the towns and villages in the area that I visited had electricity and many had at least one public telephone.

The *Agreste* of Alagoinhas, Bahia (Map 5)

This case study was carried out in the municipalities of Alagoinhas, Inhambupe and Crisópolis. Alagoinhas was the main market town of the region. The total population of these three municipalities was 371,259. Salvador, the state capital, which is about 100kms. from Alagoinhas, had a population of 2.44m. This region is divided from the coastal strip by low lying hills. The soils of this part of the *Agreste* are sandy and the climate dry but with some regular rainfall. The region, and most especially Crisópolis and Inhambupe, is a large producer of manioc as well as of beef and dairy cattle. It was once a tobacco region but this is now scarcely cultivated as a cash crop. Today's most significant cash crop is oranges. There are also some large commercially-owned plantations of eucalyptus near to Alagoinhas.

The people are predominantly Afro-Brazilians, descendants of slaves. Just as in Cândido Sales, most farmers own or rent their land but there has been heavy out-migration to southern Brazil and to Salvador from this area and family sizes tend to be smaller than in other case study sites. The impact of agricultural modernisation is greater in this area than in any other of the case study sites (most especially in Crisópolis). The proximity of Salvador and the excellent rural transport system combine to open up the markets of the metropolitan area to some of the farmers.

Although the municipal government of Alagoinhas was outgoing and supportive of the rural workers' unions and the interests of family farmers, this was not the case in the municipality of Crisópolis, even though its self-image was 'progressive' and 'modernising'. The local government of Inhambupe was indifferent to the situation of family farmers, being more interested in ranching and cash crops in the area of agriculture. However, the Catholic Diocese had been the focus of some intensive rural development work over the past 20 years. This work was being continued by the Inhambupe-based non-governmental organisation (NGO), COOPERA. This NGO promoted appropriate training for young rural people - the

next generation of farmers - and had been influential in the development of some of the local Rural Workers' Unions (STRs) and some of the local communities to which they introduced me. They continued to work with some of the more 'progressive' elements of the Catholic Church in the diocese.

PLAN OF THIS STUDY

The study is organised in nine chapters. The sequence moves on from this introductory chapter through an examination of the theoretical context in Chapter 2 and an account in Chapter 3 of the methodology that I adopted for the fieldwork. Taken together, the five chapters that follow (Chapters 4-8) constitute a systematic report on and analysis of the investigations that I carried out in the four case study sites and the findings of this fieldwork. Chapter 9 brings everything together in the conclusion.

Chapter 2: Background and theoretical context

This chapter provides a literature review and explores elements of three distinct bodies of knowledge that cover a broad and multi-disciplinary field. The *first* of these diverse realms of thinking is concerned with the conservation of biodiversity, and of agrobiodiversity, and with the relevance to manioc farming of the fiercely contested contemporary debates. The *second* discourse is about the contrasting character of the knowledge and classification systems of, respectively, agricultural scientists and small farmers and the power differential between the two. The *third* part of the chapter explains the concept of the 'Manioc Chain' as a sequence of 'stages' in the progression from the production of the manioc crop and the production of manioc foods through to their distribution and exchange and then on to their final consumption. The Manioc Chain provides a key organising concept for three of the 'findings' chapters - Chapters 6, 7 and 8.

Chapter 3: Methodology

This chapter explains how I went about answering the four research questions that are set out above. The chapter refers to some significant authorities on how best to conduct this kind of enquiry but its main focus is on the fieldwork that I carried out in the four case study sites. Much of the fieldwork was carried out quite literally in farmers' fields, and also in their homes and in *casas de farinha*. The first part of the chapter presents the research programme and establishes the key elements of the research strategy while the second part deals with the actual process of enquiry.

Chapter 4: Different worlds - classification and naming

This chapter presents and discusses contrasting systems of plant classification. The first part of the chapter considers the motives and purposes of, respectively, botanists, agronomists and the farmers themselves. Part 2 covers the different classification and naming practices and Part 3 deals with the associated cultural history in the farming communities and the inter-generational and memory-based connections that go far to explain the currently high levels of genetic diversity.

Chapter 5: Genetic diversity in manioc

Chapter 5 builds on the analysis in Chapter 4. The chapter begins with a review of the authoritative body of literature that has been written by the 'manioc scholars'. The heart of the chapter is about the total numbers of manioc varieties that currently are or that recently have been cultivated in the four case study sites. The chapter also examines recent net losses of genetic diversity.

Chapter 6: Agriculture - the production of the manioc crop

Chapter 6 commences the examination of the Manioc Chain, which is prefigured in Part 3 of Chapter 2 on theory. The organising concept for this chapter is that of the 'crop cycle', the sequence of distinct 'moments' in the farmers' work in the *roças* as they progress from the initial clearing of the land, fertilising and planting through, eventually, to harvest – and the recommencement of the cycle. The chapter emphasises the role of 'expert farmers', knowledgeable about and constantly experimenting with genetic diversity.

Chapter 7: The production of manioc foods

Chapter 7 continues with the analysis of the Manioc Chain. It shows how farmers/food producers ensure a stable and predictable supply of three of the most important foods - *farinha*, *biscoitos* and *beijú*. The chapter charts the characteristics and variety of, and innovations in, the different foods. It also explores the ever-changing technologies and labour practices that are involved.

Chapter 8: Food cultures: distribution, exchange and consumption

Chapter 8 concludes the analysis of the successive stages in the Manioc Chain. It deals with food preferences and their place in the resilient food cultures of these regions and the immense and highly efficient provisioning that the farmers/food producers conduct day by day, not only of themselves and their families but of other people in rural areas as well as large urban populations. The chapter examines distribution within the family and communities as well as the trading that takes place more widely to both near and distant

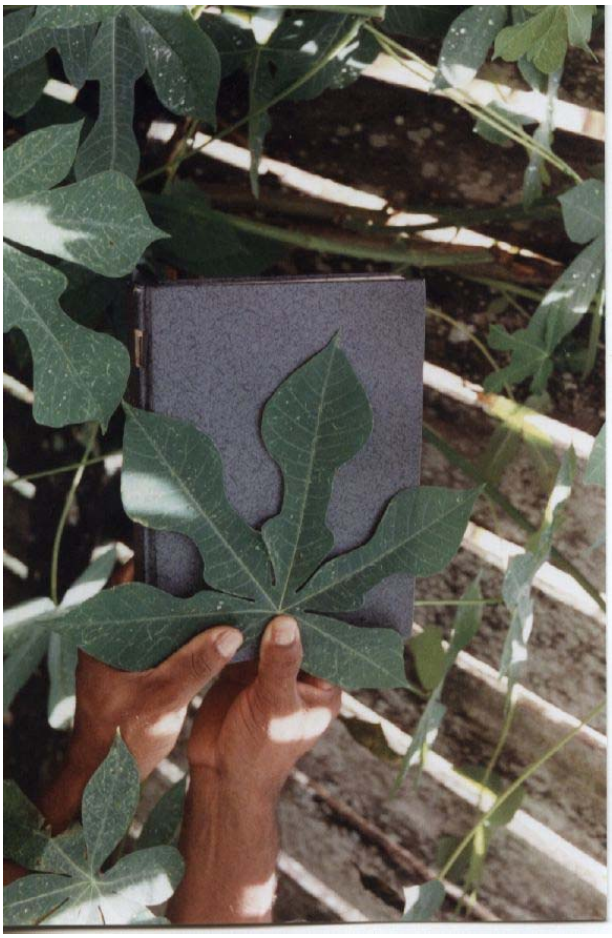
markets. It continues with a wide ranging review of the ‘tastes of necessity’, the experiences and memories of much loved foods.

Chapter 9: Conclusion

The study concludes with a summary review of the ways in which I have addressed the four research questions, presents the main findings and outlines theoretical points of interest. I reflect on the inherent limitations of the study and on future directions for research and conclude by advocating a change in thinking regarding agrobiodiversity and the farmers’ role in assuring its continuance.

CHAPTER 2

BACKGROUND AND THEORETICAL CONTEXT: AGROBIODIVERSITY, KNOWLEDGE AND THE MANIOC CHAIN



CHAPTER 2

BACKGROUND AND THEORETICAL CONTEXT: AGROBIODIVERSITY, KNOWLEDGE AND THE MANIOC CHAIN

INTRODUCTION

It is my aim in this chapter to provide context for the research and to achieve conceptual clarity by exploring elements of three distinct bodies of knowledge, each of which is highly diverse. Taken together, these have contributed to a richer elaboration in this study of the local management of genetic diversity in a particular crop than any other that, to my knowledge, has previously been ventured. From the outset it has been vital to listen to scholars and practitioners of different disciplines. This has enabled me both to construct this research project and to understand and analyse the empirical data.

The challenge has been how to bring together insights and theoretical conversations from different places so as to construct a new way of thinking about genetic diversity in a *single crop* rather than in the diversity of multiple plants that are managed within a farm or an ecosystem.

I bring together elements of theoretical ingredients such as Marxist economics and the anthropology and sociology of food that, to my knowledge, have not previously been juxtaposed. Yet in doing this, I do not directly address either the economists or the food theorists but rather those thinkers and professionals who have the capacity and drive to change the downward spiral of loss in manioc genetic diversity: the agricultural professionals and the agrobiodiversity lobby. This is because out of theory I seek a change in practice.

The first of these diverse bodies of thinking relates to the conservation of biodiversity and of agrobiodiversity in general and to genetic diversity of and within botanical species in particular, especially *Manihot*. Initially, I trace the rise in international awareness of the importance of biological diversity and look at two different approaches to the global challenge of conservation which, according to some, denote a conflict of interest. Many writers and campaigners in this realm have studied agricultural systems and 'local knowledges'. In consequence, I explore the contribution of quite distinctive literatures in Part 1 of this chapter. These are the main literatures that inform and guide Chapters 4-6 of

this study. The review in this chapter is complemented by further discussion in Chapter 5 of the specific literature on agrobiodiversity, as this relates to manioc.

The second realm of thinking concerns issues of knowledge and classification systems and the relation of both to power. This part of the chapter provides a framework both for selecting the other literatures and conversations as well as for discussing fundamental issues that are relevant to every aspect of this study. One such issue, which I discuss in detail in Chapter 4, relates to the folk-classification of manioc and local knowledge and power (or lack of power). This is contrasted to 'scientific' knowledge that informs scientists' classification of the species. This leads us to consider fundamental distinctions between the cultures of small-scale farmers [1] on the one hand and, on the other, of agricultural scientists. Understanding farming practices, the 'agri-culture', *and* the food culture of these farmers, is central to this study. To be able to do this I draw on the work of scholars who can help in the tasks of identifying the farmers' strategies and of understanding differences, both class-based and cultural, within rural communities and between these communities and an outside world - the impacts of which, whether positive or negative, they cannot avoid. These literatures have a general bearing on the study and are especially relevant for Chapter 3 on methodology and for Chapter 5 on agrobiodiversity.

The third body of thinking refers to the economically and culturally specific activities that comprise each of the components of the Manioc Chain - production, distribution, exchange and consumption. The first sections in this third part of the chapter relate to a culturally located economic analysis and to some recent approaches to economic anthropology. This

[1] I have chosen to use the term 'family' or 'small-scale' farmers in this study in an attempt to examine some of the commonalities between the Amazonians living in the two Pará case study sites and the rural people in the Bahian sites.. This is not to ignore the Amazonian classification of non-indigenous populations, the '*caboclos'*, the various definitions of Amazônia's 'traditional populations' or the term 'peasantry'. These terms are contested. Some Brazilian scholars such as the anthropologist, de Almeida (1998 in the preface to Acevedo and Castro), contest the term *caboclo* '…more as a common notion that was judged to be adequate to take race issues into consideration'. Pace (1998:145) recognises the common usage of the term as pejorative. The term 'traditional populations' is defended and defined by Castro (1997:224), for example. It is increasingly being used by Amazon scholars. The term 'peasantry' is helpfully assessed by Forman (1975) who provides a synthesis of the way in which the term has been defined and contested by Kroeber (1948), Redfield (1930) and Wolf (1966) and others. Yet the use of this term, popularly appropriated by many Andean and Central American peasants – *campesinos*, is today rarely appropriated by their Brazilian equivalents in the north-east and north, who frequently call themselves '*produtores' (*producers) or '*trabalhadores'* (workers*).* These terms are reflected in the names of their unions (STR's) and Associations (*…de produtores*). The term 'farmers' is the one most often used by those scholars and practitioners who discuss biodiversity, farming systems and the like (see, for example, Brookfield (2001, 2003) and his collaborators in PLEC, as well as Wood and Lenné (1999). This term seems to be the least contested term and the most appropriate one for the purposes of this study. For a quantitative approach to the definition of family farmers, see Gov. of Brasil, *Min. de Desenvolvimento Agrário* (2000).

literature informs the content and moulds the structure of chapters 6-8 of this study. In particular, it informs the sub-sections of chapter 8 regarding the distribution and exchange of manioc and manioc foods.

The final section of Part 3 on the Manioc Chain, under the heading of 'Consumption', relates to food culture and to distinctions that are now being made by some food sociologists and anthropologists and that relate to the sensory world, in particular smell and taste, and individual and collective memory of such experience. Food, which is the product of agriculture within any given society, is everywhere produced, distributed and consumed according to cultural criteria. In Chapter 7 and in the section on food consumption in Chapter 8 of this study I argue the significance of valuing food and food culture in our investigation of why, how and where farmers do achieve - and outsiders might help to ensure - the conservation *in situ* (on-farm) of manioc genetic diversity.

PART 1

BIODIVERSITY AND AGROBIODIVERSITY - FROM RIO'S 'EARTH SUMMIT' TO JOHANNESBURG TEN YEARS ON

In this section I examine some concepts of biodiversity and agrobiodiversity and review a recent history. This overview is in support of our study of the management of manioc agrobiodiversity. In assessing the threat to the genetic diversity of manioc we need to understand some of the factors that bear on its conservation as well as on that of other food crops. This research aims to contribute to the body of debate, within Brazil and elsewhere, among those who are involved in conservation initiatives relating to a particular food crop rather than, as is more common, to 'agroforestry' and to other tropical forest and ecosystem conservation initiatives. Genetic diversity, and the pros and cons of the best way forward, are set in the context of a recent history, which is that of the heavily contested debates between, on the one hand, proponents of 'development' and, on the other hand, of the environment - and of social justice. The issues as they affect agrobiodiversity in manioc and the reasons for its erosion are analysed in Chapter 5.

Throughout the long period of settled agriculture farmers have exchanged seeds on the basis of a 'common heritage'. In terms of this long history it is only comparatively recently that the question even arose *either* of there being such a thing as intellectual property rights in plants *or* of there being any need for a formal conservation strategy. For many food crops, including manioc, local agri-cultures and local food cultures went largely unrecorded, with

production processes left in the hands of a subordinated class, unregulated and unremarked. Yet modernisation has changed things. Nowadays, the debates increasingly are about the impacts of globalising markets upon a previously taken-for-granted genetic diversity.

> 'Food sovereignty and security, livelihoods, landscapes and environmental integrity are underpinned by agricultural biodiversity and its component genetic resources for food and agriculture. These have been developed by indigenous peoples and women and men farmers, forest dwellers, livestock keepers and fisherfolk over 12,000 years through the free exchange of genetic resources across the world. Since the advent of industrial agriculture and the increasing globalisation of markets, tastes and cultures, much of the wealth of agricultural biodiversity is being lost both on-farm and in genebanks and increasingly the integrity of these resources is being compromised by genetically modified organisms.' (ETC Group, GRAIN and ITDG 2002) [2]

The campaigning and research organisations that published the report cited above on 'Sustainable Agricultural Biodiversity', make clear the global context for ongoing research on the management of the genetic diversity of manioc by small-scale farmers. However, as we shall see, those who have campaigned so hard for biodiversity conservation, especially over the last two or three decades, have been slow to accept just how urgent it is to promote the conservation of genetic resources for food and agriculture.

Many environmental activists had high hopes of the 'Earth Summit' - or 'Eco 92' for Brazilians - held in Rio in 1992. For them it represented the culmination of almost a decade's work - campaigning which was never again to be so vigorous and so independent from world governments and multinational business interests. 1992 came at the close of this hopeful period, during which there had been a massive increase throughout the world in public and governmental environmental awareness. It was the Rio Conference from which emerged the Convention on Biological Diversity (CBD), to which I return below.

The campaigning experience both before and after 1992 is significant for this study in that it revealed the fault lines in the superficial international consensus on why biodiversity matters, on what should be done to conserve it and in whose interests. In 1992, Northern (or Western) NGO campaigners experienced the nemesis of their once hopeful ambitions. They

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[2] This process is moving very rapidly. 'In the 1990s, the adoption of modern varieties of wheat, rice and maize in developing countries reached around 90%, 70% and 60% respectively. In Latin America the take-up of modern rice varieties leapt from 4% to 58% in two decades. Access to, and use of, a wide range of agricultural biodiversity is threatened by this simplification of production systems. … The UN's Food and Agricultural Organisation (FAO) estimate that more than 90% of crop varieties have disappeared from farmers' fields in the past 100 years. Agricultural plant varieties are continuing to disappear at 2% a year. These major changes in production lead to simplified and less resilient agro-ecosystems, reducing not only the number of niches but also the range of products and their distribution over time and space. Single crops are more vulnerable to the rapid spread of disease - this greatly heightens the vulnerability of resource-poor farmers.' (ITDG accessed from the web April 2005)

had succeeded in raising awareness of a range of vital issues to the world stage, only to see them re-badged in such a way that the interests of multinational capital predominated over broader environmental concerns and over the interests of the poor. The fact that the Earth Summit was held in Brazil was significant. In the previous decade, the population of the Amazon region had increased by around one million and 'on a prudent estimate, by 1988, about 8 to 10 percent of the rainforests of the Amazon had been cleared.' (Hecht and Cockburn, 1990) [3]

By the end of the 1980s rainforest destruction had become an international issue and had achieved a high media profile, with the focus being very much on the Brazilian Amazon. The rubber-tapper, trade unionist and environmentalist Chico Mendes, murdered in Acre in December 1988, became a potent symbol of resistance both to the destruction of the rainforest and to rampant social injustice in the region.

International campaigning brought together people with divergent philosophies. In the last few years of the 1980s I played a small part in this international movement. The British NGO for which I then worked campaigned alongside Brazilian NGOs and popular organisations to raise awareness of the human consequences of the environmental destruction in the Brazilian Amazon. According to Brazilian researcher Zhouri (1998), who studied British campaigners for the Amazon Rainforest, campaigners included 'tree-people', 'trees and people' people and 'people' people, each group with its particular perspective. .[4] The Brundtland Report (1987) [5] was encouraging to many campaigners, whether 'tree' people or 'people' people. This was because the Report seemed to merge the concerns of the environmentalists and the development lobby. However, Gilbert Rist (1997) convincingly argues that the Report lacked conceptual clarity and that it incorporated a contradiction between, on the one hand, 'economic growth' - which was now subsumed under the rubric of 'sustainable development' - and, on the other hand, environmental protection. The Report discussed 'a new era of economic growth' and a 'five to tenfold increase in manufacturing output' (implying that this was necessary), while at the same time stipulating that 'the simple duplication in the developing world of industrial countries' energy use patterns is neither feasible nor desirable'. Rist concludes that

[3] Goodman and Hall give an estimate of 12% by the end of 1988. They also emphasise the growing trend at that time, with around 20,000 sq. km. forest loss per year (Goodman and Hall, 1990:1) - although these figures are regularly contested and revised.
[4] 'Trees' signifies those campaigners that lay stress on environment/biodiversity concerns, 'people' stands for those that emphasise development/social justice issues, while 'trees and people' signifies the synthesis of the two former tendencies.' (Zhouri 1998:91-2)
[5] The report of the World Commission on Environment and Development - the Brundtland Commission. (1988)

> 'The main contradiction, then, in the report of the Brundtland Commission is that *the growth policy supposed to reduce poverty and stabilize the ecosystem hardly differs at all from the policy which historically opened the gulf between rich and poor and placed the environment in danger* (because of different rates of growth which can be achieved depending on the use of either non-renewable or renewable resources). (*op.cit.*:186)

The Commission could neither face up to this contradiction nor could it make any more than palliative recommendations, for example, for recycling. This incapacity was due, so argued Rist, to Brundtland's failure to comprehend that

> '…market-induced "globalization" is making ecological awareness an impossibility. Whereas an economy based upon local resources makes people immediately sensitive to any deterioration in their environment, and in most cases eager to preserve it, the market makes it possible to take resources … from one region, to consume them in another region, and to dispose of the waste in yet another … Furthermore, whereas one aim of environmentalists is to promote a diachronic view of resource use (by protecting the rights of future generations), market price responds only to effective demand expressed here and now, in complete abstraction from long-term effects.' (*op.cit.*: 186-7)

After 1992 powerful corporations increasingly became major players in this field and argued, with considerable success and despite evidence to the contrary, that there was no contradiction between their activities and the broad aim of 'preserving biodiversity.'

Despite the contradictions, many campaigners used elements and recommendations derived from Brundtland. Five years later they had hopes that some of the international instruments that came out of the Earth Summit might provide tools for their own future work. Yet, even at this late stage, agricultural biodiversity was scarcely discussed in these international fora or beyond. It was during the decade of the nineties that the issue rose to greater prominence on the political agenda. In 1996 FAO held an international conference in Leipzig on Plant Genetic Resources for Food and Agriculture (PGRFA). Out of this eventually emerged the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) - also known as the International Seed Treaty - and a 'Global Plan of Action' for the conservation and sustainable utilisation of PGRFA.

Something had been gained with the international acceptance of the Convention on Biodiversity (CBD). It is one of those international tools that has special relevance to this present research. The CBD is a legally binding international treaty that has now been ratified by 180 countries (including Brazil). [6] At first the CBD gave hope to many campaigners. It also presented the world's governments and civil society with the huge

[6] The CBD is the most broadly supported legally binding international agreement in history. (Posey, 2000)

challenge not only of how to implement it but also of how to assess the extent of the problem.[7] The CBD has been described as 'a watershed for agrobiodiversity', and this despite the neglect of the relevance of genetic resources for agriculture and food, in the inputs of the International Union for the conservation of Nature (IUCN) and the Worldwide Fund for Nature (WWF), which are among the two most influential international conservation agencies. (Wood and Lenné, 1999)

> '…the CBD now includes key elements recognizing domesticated or cultivated species, the need for scientific research on genetic resources, and *in-situ* and *ex-situ* conservation. …The agreed and extensive 'Agenda 21' gave a fuller coverage to agriculture' (*op.cit.*:4-5)

However, there are others who are more critical.

> 'The majority of indigenous peoples regard it as little more than a sovereignty grab by nation states who want to take over all biological and ecological resources existing on their land and territories. . intellectual property rights (IPRs) are provided as the only principal mechanism for "equitable sharing" and protection. But IPRs are problematic… IPRs undermine the free exchange of commonly held resources, while stripping communities of their control over indigenous knowledge, cultural and genetic materials…They recognise only market economic values, failing to consider spiritual, aesthetic or cultural - or even local economic - values. They are subject to manipulation by economic interests that wield political power…. Contemporary intellectual property law is constructed around the notion of the author as an individual, solitary and original creator ……Those who do not fit this model - [including] peasant cultivators of valuable seed varieties - have no such protection.' (Posey, 2000:40-1)

Following the 1992 Earth Summit the Global Environment Facility (GEF), a fund supported by the World Bank, UNDP and UNEP, was set up to fund projects that help to meet the CBD's aims in developing countries. Fortified by the ideals of the CBD and, in many cases funded through GEF projects, the nineties saw an increase in awareness of the issues as well as in publications on the subject of biological diversity - usually called simply 'biodiversity'.[8] However, Wood and Lenné (1999) reveal that only 2.46% of the GEF's funds currently allocated to biodiversity projects are specifically for agrobiodiversity (with projects located mainly in a few crop centres of diversity such as Ethiopia, Turkey and Peru). The same study also cites Abramovitz's survey of US bioconservation funding, of which only 0.46% deals with genetic resources for agriculture. (Abramovitz, 1989)

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[7] The goals of the CBD are summarised by its own Secretariat in the following simple terms: 'The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.' (Secretariat of the CBD, 2000)

[8] Although the GEF has funded many research programmes in the Amazon area, none, to my knowledge, have attracted funding from this source in north-east Brazil.

The positions continue to be polarised. Ten years on from Rio, in Johannesburg's 'Earth Summit' in 2002, Friends of the Earth (FoE) Director, Charles Secrett said

> 'This position paper on 'Globalisation, Trade and Financing' [of the US-EU] will drive a deep wedge between North and South…This paper proves that the US and EU will sacrifice the environment and poor countries' needs for their own selfish free trade agenda.' (Secrett, August 2002)

Secrett's condemnation of the US-EU position demonstrated just how deep was the polarisation that persists between, on the one hand, northern governments and, on the other hand, the governments of many developing countries and NGOs both from North and South. [9]. The highly respected Brazilian national NGO, *Instituto Socio-Ambiental* (ISA) (Social and Environmental Institute), identifies a further polarity that exists between developed countries that possess biotechnology and poor countries, rich in biodiversity.[10]

Tracing the multiple and complex international developments that moved towards the full implementation of the CBD would go well beyond the scope of this chapter. This is not to dismiss high profile as well as less well-publicised activity and research as not being relevant. Far from it. The conservation of biodiversity - and more recently of agrobiodiversity for food - and traditional and indigenous knowledge are high on the agenda of campaigners from many countries in both North and South who are challenging the Worth Trade Organisation, for example, and who have participated in the various World Social Fora that have taken place in recent years. [11] Biodiversity conservation is one item on a broad social, economic and environmental agenda that also features, for example, the promotion of sustainable agriculture, along with the halting of the greenhouse effect and the protection of the world's sources of drinking water and water for household and agricultural use, the elimination of hunger, equitable trading terms between the rich and poor nations and, even, the operating structure of the World Bank.

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[9] There are also profound differences of opinion and emphasis between' environmental' and 'development' NGOs and civil society organisations (CSO) in respect of some of the issues in question. These issues include genetic patenting, the use and promotion of GMOs, intellectual property rights and indigenous and traditional knowledge.

[10] From an ISA (Brazil) news report 22 February 2005 (by Fernando Mathias) reporting on debates that took place in Bangkok in the 3rd meeting of the Working Group on Access and Benefits Sharing.

[11] Vandana Shiva, one of the most high profile campaigners in this area, asserts: 'Sustainable use of [land, water and agricultural biodiversity] in turn requires that their ownership and control lie with decentralised agricultural communities in order to generate livelihoods, provide food and conserve natural resources. These three dimensions of ecological security, livelihood security and food security are the essential elements of an agricultural policy which is both sustainable and equitable. The current processes of globalisation of agriculture threaten to undermine all three dimensions of sustainable agriculture.' (Shiva 2002:11)

Our special interest in this research project relates to a particular aspect of biological diversity - that is agricultural diversity or agrobiodiversity - and, more specifically, to genetic diversity within a single crop. The divisions and differences highlighted on the macro-stage of international social, environmental and economic politics are mirrored in the micro-arena of this research, in the differences between farmer and agronomist.

Before exploring the differences and debates surrounding the issue of conservation of genetic diversity, I need to define more precisely some of the terms that are in use. Table 2 - 1 below highlights differences in the definitions that are used by various authorities.

For the purposes of this study, I am using the rather narrow Kaihura and Stocking definition of 'agrobiodiversity'. This is because I am examining the management of the genetic resources of a single crop rather than those of multiple crops within one or more managed ecosystems. I use the term to signify 'that component of biodiversity that contributes to food and agricultural production' (Kaihura and Stocking, 2003), on the grounds that 'indigenous knowledge and culture are integral parts of agricultural biodiversity management.' (Cromwell,1999) My treatment of the term also refers to FAO's programme of PGRFA.

I use the term 'agrobiodiversity' to refer to both cultural and species diversity - rather than just to genetic diversity - as these are present within an agricultural environment. In all four of my case study sites local agronomists were at pains to stress the advantages to family farmers of *diversifying* the agricultural base, usually by incorporating cash crops into their farms. Yet they appeared to be much less interested in encouraging farmers to maintain genetic diversity within single crops, which is the focus of this study. In fact, most of the farmers in the case study areas did once manage a much wider variety of crops and make use of a greater number of plants and trees, as well as of game and fish, to support their families. This diversification was, and remains, important for family farmers. Further research on family farmers and agrobiodiversity in the kind of areas in which I worked in Brazil would be most valuable and would complement my work on the management of manioc. [12]

[12] The important work of the Brazilian PLEC team with floodplain populations in the Amazon has produced interesting insights into local production and conservation patterns. The methodologies used were novel, rigorous and multidisciplinary. The work, part of an international project, was funded by the GEF. (Pinedo-Vasquez *et.al.*, 2003) Unfortunately, to my knowledge, no such work has been undertaken in north-east Brazil where the process of rural change and economic modernisation is moving at least as rapidly, if not more so, than in Amazônia.

Table 2-1: Definition of terms relating to biological diversity

Term	Definition	Source
Biological diversity (or Biodiversity)	'…the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different items and their relative frequency. For biological diversity, these items are organized at many levels, ranging from chemical structures that are the molecular basis of heredity to complete ecosystems. Thus the term encompasses different genes, species, ecosystems, and their relative abundance.'	Office of Technology Assessment of the US Congress (1987) cited by US National Research Council (1992).
Species diversity	'…normally refers to the diversity among species'	US National Research Council (1992).
Genetic diversity	'…refers to the diversity within species'	US National Research Council (1992).
Agrobiodiversity Shorthand for agricultural biodiversity (6) (The sources given here indicate a spectrum of definitions and are by no means comprehensive)	• 'This term is much more common than *agrodiversity*. It is commonly used to mean the diversity of useful plants in managed ecosystems.' (1) • 'management and direct use of biological species, including all crops, semi-domesticates and wild species' (2) • '…indigenous knowledge and culture are integral parts of agricultural biodiversity management' (3) • '…although such wild food is often of critical importance to farm families (Scoones et al 1992), it is not part of the farm and is not agrobiodiversity.' (4) • 'That component of biodiversity that contributes to food and agriculture production. The term agrobiodiversity encompasses within-species, species and ecosystem diversity' (5) • 'All species and varieties used by or useful to people, with a particular emphasis on crop, plant, and animal combinations. It may include biota that are indirectly useful, and emphasizes the manner in which they are used to sustain or increase production, reduce risk, and enhance conservation.' (6)	1. Brookfield (2001) who also cites sources 2 and 3. 2. Huijun *et. al.* (1996) 3. Cromwell (1999) 4. Wood and Lenné (1999) 5. FAO in Belgian Clearing House Mechanism (for CBD) http://bch-cbd.naturalsciences.be/belgium/glossary/glos_a.htm 6. Kaihura and Stocking (2003)
Agrodiversity	'…(also termed "agricultural diversity") is "the many ways in which farmers use the natural diversity of the environment for production, including not only their choice of crops but also their management of land, water and biota as a whole."(1) The PLEC project* has seen agrodiversity as essentially to mean "management diversity". This is related to "agricultural biodiversity" but encompasses much more….Conceptually, "agrodiversity" is the broadest of the terms used to capture biological diversity and the diversity of management and organization at a variety of temporal and spatial scales' (6)	1. Brookfield and Paddoch *et al* (1994) 2. Kaihura and Stocking (2003) *PLEC - People, Land Management and Environmental Change project.

The conservation of agrobiodiversity - by whom? and for whom?

Those who share a common concern about the conservation of genetic diversity are divided as to the emphasis that should be placed on different conservation strategies, whether *ex-situ* or *in-situ.* Many also perceive a conflict of interest between, on the one side, agribusiness who concentrate on proprietary control of genetic resources and scientists working for the major international gene banks and, on the other side, indigenous peoples and small farmers along with their allies and advocates. The latter are convinced that the powerful disregard what is in the interests of indigenous peoples and small farmers. (Posey, 2000) This debate, which is so much more than a debate and which is sharply partisan, inevitably shapes the discourse on agrobiodiversity.

As we have seen, much of the activity aimed at conserving biodiversity and undertaken under the CBD has not been concerned with the conservation of the genetic resources of cultivated, edible plants or crops. Least of all has this activity focused on *in-situ* conservation. The term *in-situ* means different things to different people and can mean on-farm conservation either by farmers or by local agricultural stations that are run by extension agents and/or scientists. (Brush, 2000:4) Stephen Brush, editor of a volume of papers on the subject of on-farm conservation of crop diversity, notes that there has been a 'burgeoning of research in the ecology and biogeography of crop genetic resources in several counties and for different crops'. He also observes that the research that is directed at answering questions on *why* to undertake *in situ* conservation and on *how* to do so is novel, interdisciplinary and complex. (Brush, 2000)

Amongst those who are interested in the genetic diversity of traditional varieties of food crops, *beyond* the realm of the small-scale farmers, there are essentially two tendencies or strategies at work. [13] The first of these is represented by international agricultural research stations such as the International Centre for Tropical Agriculture (CIAT) [14] in Colombia and other centres of the Consultative Group on International Agricultural Research (CGIAR) [15]. These centres hold significant gene banks and other collections of plant genetic resources which they conserve *ex-situ, in vitro* and, more recently (at least in the case of manioc) in

[13] Cromwell *et. al* (2001:Box 3.1) present a full table of stakeholders in agrobiodiversity conservation. However, for our purposes, I have simplified the divide.
[14] CIAT holds the largest collection of manioc germplasm in the world referred to as the World Core Collection. In 2004 they held germplasm for 6,080 varieties of manioc. (Koo *et al..*,2004)
[15] CGIAR signed an 'in trust' agreement in October 1994 by which associated research centres agreed to hold so-called designated germplasm (including manioc) in trust for the international community under the auspices of the FAO-UN. This material is then freely available to researchers as long as they renounce all intellectual property rights over the material. (Koo *et. al*., 2004)

cryo-conservation, by which means seeds are frozen at a very low temperature to enable conservation over many decades. The Brazilian collections of manioc genetic resources are held by EMBRAPA. These valuable resources are held principally for crop improvement programmes run by agricultural scientists but the resources are also available for scientists undertaking any type of research. [16] Crop improvement programmes potentially can benefit small-scale farmers but the main beneficiaries are industrial scale farmers in the modern sector. [17]

The second of these sectors is interested in agrobiodiversity essentially *for* and *in the interests of* small-scale farmers and of traditional and indigenous populations. This second sector includes many so-called civil society organisations (CSO's) and national and international development agencies, including NGOs. These organisations advocate the maintenance of on-farm agrobiodiversity by farmers both in their own interests and on equity grounds, for the sake of a farming system where the poorer farmers are not driven off their land to live in the cities. One of the many examples of local commitment to these principles, as well as a protest against perceived injustices, occurred in May 2002, while I was in Brazil for this research. The Brazilian NGO *Grupo de Trabalho Amazônico* (GTA), Amazon Working Group, hosted an International Workshop of the project *Growing Diversity* in the Western Amazon town of Rio Branco. The resulting declaration constituted a commitment to future action by the participants and a complex, insightful critique of what they called the 'current dominant models of development [that are] the main cause behind the deterioration of biological diversity…' as well as a commitment (among several others) to 'perform crop diversification and actively promote diversified integrated farming systems based on biodiversity in our communities and organizations. The use of local and traditional varieties should be promoted'. (see Appendix 4 for the full text)

Several British-based agencies fall into this second pro-farmer category. These include the environmentally orientated International Institute for Environment and Development (IIED), the more 'development' orientated Intermediate Technology Development Group (ITDG)

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[16] One example of such research has been carried out in the Universities of Newcastle and Madrid. A gene from a single variety of manioc, acquired from the CIAT collection in Colombia, has been used successfully used for the treatment of brain cancer. (Cortes *et. al*., 1998) Research scientists are concerned that germ plasm be conserved for 'current and far distant future generations'. Yet in a recent publication they express concerns for the future of the financing of such conservation facilities. (Koo *et. al.*, 2004)

[17] See further discussion in Chapter 6. An important international participative project near Alagoinhas (BA) resulted in improved crop yield, the introduction of fertilizers and pesticides and diminished agrobiodiversity. It increased yield and income for *some* local farmers only. Certain 'improved' varieties of manioc were introduced to the area during the project trials. One of the project impacts has been reduced agrobiodiversity in the area.

and several other research institutions such as the Overseas Development Institute in London. In recent years staff members in these institutions have made some important contributions to how we understand the significance for rural well-being in developing countries of the maintenance of agrobiodiversity. [18] In addition, some of the UK international development NGOs such as Action Aid and Christian Aid, in tandem with their fervent opposition to the introduction of genetically modified crops in the developing countries where they work, also present impassioned arguments in favour of promoting agrobiodiversity.

A Christian Aid report (1999) reflects the protesting voices of some of their partners in southern Brazil who have personally witnessed huge areas of land being taken over for planting soya:

> 'In less than 15 years, two million rural workers in northern Paraná, in the south of Brazil, were expelled from their land because of expanded planting of soya. Eighty per cent of modern soya plantations were formerly used to grow food. The food was "for people, for children. Now they plant soya for the pigs in Europe," says João Claudio of the Eastern Amazon Forum of Non-Government Groups'. (Christian Aid, 1999)

Two of the international organisations that most vigorously campaign both in favour of agrobiodiversity and - because they draw a direct link - against biotechnology giants such as Monsanto are the ETC Group and GRAIN. GRAIN's website makes the following claim, once again contrasting agribusiness with what they call people-centred agricultural research:

> 'This section of the GRAIN website is about this growing disjuncture between the industrial agricultural research agenda and the movement for people-centred sustainable agricultural research.' (GRAIN website April 2005)

Cromwell and her colleagues (2001) are even more direct in recognising that their detailed yet balanced analysis of agricultural biodiversity indicates the existence of a major conflict of interest - as, indeed, does the analysis that I develop in the present study.

> 'This analysis of agricultural biodiversity points to the inevitability of conflicts between the vastly differing interests of diverse stakeholders in agricultural biodiversity, exacerbated by their dramatically different degrees of effective voice and market power.' (Cromwell *et. al.*, 2001)

More hopefully, they conclude a section of their study by offering some recommendations to the development agencies to which their study is addressed. These include, in summary:

- recognising the importance of treaties

[18] See, for example, Pimbert (1999 - IIED) and Cromwell *et al.* (in Kozell, 2001 published by IIED). The latter's chapter on Agricultural Biodiversity brings together contributions from, respectively, Cromwell (Overseas Development Institute), Cooper (CBD Secretariat) and Mulvaney (ITDG). Christian Aid's Report 'Selling Suicide' (1999) and various briefings from Action Aid, including one on GM crops (May 2003), present impassioned arguments against GM foods.

- promoting the development of institutions for effective management of agricultural biodiversity at local, national and international levels
- creating mechanisms that return a fair proportion of the benefits to those who manage agricultural biodiversity at local level
- gaining public support for non-market uses of agricultural biodiversity (e.g., the provision of ecosystem services and functions)

Even in this conflictual terrain there continues to be some valuable, practically orientated research and communicating. An interesting body of initiatives has been that of the United Nations University international project on People, Land Management and Environmental Change (PLEC) [19]. Starting out as a cooperative research project on small farmers' practices, PLEC attracted GEF funding from 1998-2002. They have published several books on agrobiodiversity, reporting on their project activity in various countries. Their periodical, *PLEC News and Views*, is available on-line and is a permanent forum for the dissemination of research. (Brookfield, 2001, Brookfield *et. al*., 2002, Brookfield *et. al*., 2003, Kaihura and Stocking, 2003) The PLEC collaborators are mainly researchers whose thinking is rooted in their fieldwork. Their research is quite distinctive and notably sympathetic to the interests of the small farmers with whom they work.

As we have seen, campaigners as well as analysts frequently highlight the opposition between the interests of family farmers and of agricultural scientists and extension agents. In the second part of this chapter - and substantively in Chapter 4 - I discuss how these differences are constructed in terms of different social classes and distinct cultures and the related systems of knowledge. Many if not most qualified observers recognise that local knowledge (including local technological know-how) is a part of the dynamic of conserving agrobiodiversity, *ex situ* conservation strategies, and sometimes *in situ* (off-farm) strategies. Yet few observers take local knowledge and culture sufficiently into account when it comes to devising these conservation strategies. In part, this is because many of these observers are principally concerned to maintain genetic resources for crop breeding programmes. (see, for example, Swanson and Goeschl, 2000)

In this study I focus on the very different interests of the small farmers. For this reason the discussion in Chapter 5 relates local knowledge of the genetic resources of manioc to the

[19] The PLEC objective 'is to inform the scientific and professional community concerned with rural development and conservation in smallholder farming regions of the developing world, by calling attention to recent publications, new research methodology, and developments in agrobiodiversity, in the study of farmer innovation and farmers' technical knowledge, and in development practice and thinking generally.' (PLEC website April 2005)

theme of *on-farm* conservation. The important body of research that relates to genetic diversity specifically in manioc is reviewed in that chapter.

PART 2

KNOWLEDGE AND POWER: DIFFERENCES IN CLASSIFICATION SYSTEMS

The people who know the most about genetic diversity in manioc in their micro locations are the family farmers who are both the objects and subjects of this study. Not only do they know most about the management and development of this genetic diversity, but they are also the most adept at processing and making use of manioc *and* they enjoy the foods that they make from it. They have the highest possible motivation to retain and develop their practically rooted knowledge, which is about physical and social survival and reproduction.

By asserting that farmer's knowledge is central to this thesis it is not at all my intention to undermine the knowledge and findings of research scientists. Yet it *is* appropriate to consider what factors are bringing about the erosion of the existing diversity that is accompanying the 'modernisation' of the rural social and economic environment. The approach that I have adopted for this enquiry starts with the realm of the small farmers. The approach contrasts with that of many research scientists who start in their own realm of gene banks, collections and laboratories. The approach also contrasts to those of some conservationists, a point that I return to in the following discussion.

My empirical findings in relation to the classification of manioc are informed by the botanists and ethnobotanists whose work is discussed in Chapter 5. Yet there are underlying issues, to do with knowledge and power, which enter into the business of classifying. It is impossible to discuss the connection between the conservation of manioc varieties and the farmers' classification and naming of manioc varieties without reflecting on social class and social distinction among the various agents who give their different accounts of manioc. As Pierre Bourdieu acutely observed, **'**nothing classifies somebody more than the way he or she classifies.' (Bourdieu, 1990a:131)

In one of his seminal works Bourdieu suggests a way in which to view the class system in contemporary society. The objects that are *classified* and the person who performs the act of *classifying* both become legitimate objects of scrutiny. The person who classifies, whoever

he or she may be, is located within a social class in time and in space and this enters into the system and the acts of classifying. There are also intimate connections between knowledge and power since there is frequently a power differential. Knowledge has a sensory as well as a conceptual component so different tastes and different perceptions are connected to values that are asserted and defended by *both* marginal and dominant social classes. Such differences are an habitual source of antagonism between social classes. (Bourdieu, 1999a) Bourdieu affirms the Marxist concept of a class society, adding a concept that he calls *habitus.*

> 'Each class condition is defined…by everything which distinguishes it from what it is not and especially from everything it is opposed to; so social identity is defined and asserted through difference.' (Bourdieu, 1999a:170-172)

For Bourdieu there is a constant struggle between different systems of classification, a micro-politics, which becomes evident from the empirical observations that are analysed in Chapter 4 regarding manioc classification and in Chapters 6, 7 and 8 about production, distribution and consumption. Bourdieu relates this struggle to the efforts of different classes and class fractions to gain competitive advantage.

> 'The struggle over classifications is a fundamental dimension of class struggle. The power to impose and to inculcate a vision of divisions, that is, the power to make visible and explicit social divisions that are implicit, is the political power *par excellence*. It is the power to make groups, to manipulate the objective structure of society.' (Bourdieu, 1990:138)

The difference that concerns us, and which is further explored in Chapter 4, is primarily that between, on the one hand, the farmers and, on the other hand, the agronomists, agricultural scientists and botanists. All of them share an interest in manioc yet they inhabit very different worlds. It is through examining the *habitus* of farmers and the class differences between them and these others that we can begin to understand the social construction of manioc. [20]Equipped with this understanding we can proceed to consider how the genetic diversity of manioc can best be conserved in the farmers' interests.

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[20] For Bourdieu, *habitus* means the manner and style in which we carry ourselves, ways of speaking, feeling and thinking, and especially as these orientate us towards other people. Thus gender, for example, structures the ways in which human beings relate to each other in multiple ways. The *habitus* is inside our heads. It is an interpretative schema. It is what we believe about how the world - our world - works. It is how we habitually act, and it predisposes us to do certain things. It generates practices, including how we interact with other people. We act within certain structures and, in so doing, reproduce these self-same structures. Although Bourdieu is not a structural determinist, he accepts that agents operating within a specific *habitus* will tend to act in certain ways under given circumstances. He also says that 'the *habitus* goes hand in glove with vagueness and indeterminacy.' (Bourdieu, 1990:77) The classificatory models are coherent, but only up to a point. People think about what they are doing. They *strategise*. There are constraints in a game, even rules, but there are also opportunities. 'Strategies are, according to Bourdieu, the ongoing result of the interaction between the dispositions of the *habitus* and the constraints and possibilities which are the reality of any given social field - whether it be cultural consumption, landholding, education or whatever.' (Jenkins, 1992:83)

Bourdieu's insistence that any knowledge is socially and thereby culturally located is supported by Lakoff (1987), who argues that it is impossible to achieve any truly objective classification of things. The ways in which we as human beings classify things, emotions, actions or, indeed, any element of our experience are inherently subjective. What we do depends not on the nature of the thing or activity that is being classified but, rather, on the person who is performing the act of classification - and the group to which he or she belongs. As Lakoff acknowledges, his viewpoint challenges '…two thousand years of philosophising about the nature of reason'. He explains his challenge to the philosophical and scientific tradition as follows:

> 'Thought is *embodied*, that is, the structures used to put together our conceptual systems grow out of bodily experience and make sense in terms of it; moreover, the core of our conceptual systems is directly grounded in perception, body movement, and experience of a physical and social character.' (Lakoff, 1987:xiv)

The critical geographer Noel Castree, in discussing the social construction of 'nature', also recognises that there is no single 'objective' discourse that is available to us when we think about our own relationship to the external world.

> 'Knowledge and language are the tools we use to make sense of a natural world that is both different from us and yet which we are a part of. There is, therefore, no objective, non-discursive way of comprehending nature "in the raw". We have to live with the fact that different individuals and groups use different discourses to make sense of the same nature/s. …. Whose discourse is accepted as being truthful is a question of social struggle and power politics.' [and later] 'there is never any way to access, evaluate and affect nature that does not involve socially specific knowledges and practices.' (Castree, 2001: 12 and 17)

To 'access, evaluate and affect' we should add 'classify.'

Multiple logics

The multiple logics of the divergent systems that underlie the naming and classification of manioc provide an example of the ways in which the perceptions of family farmers, agronomists and botanists are embodied in the diverse experiences, interests and worlds of these very different social actors. In Chapter 4 I address these different logics, and the contrasts between them, by first describing their different classificatory practices. These practices are well charted in the case of the botanists; less widely known but still comprehensible to specialists in the case of the agronomists; and largely obscure to the outside world in the case of the small farmers. In contrast, in the farmers' cultures knowledge is not a matter of textbooks and is not communicated by formal learning. The structures of their knowledge systems are established orally, largely without formal

recognition or reproduction through that low prestige part of the national educational system that *is* accessible to them. The extensive literature on 'Indigenous Knowledge (IK)', analogous to 'Rural Peoples' Knowledge (RPK)' is reviewed and discussed by Ellen and Harris (2000). This is in contrast to the university-based knowledge systems of botanists, agronomists and indeed of social scientists. The form of the farmers' system is complex. The people interact not only with the natural environment but also with the human culture of their own and of past generations of indigenous, forest and rural people. They do this on a local basis, although the communities to a greater or lesser extent are open to external influence.

Western biology and farmers' knowledge systems do, of course, have a common point of reference in that the former 'grew out of attempts to systematize knowledge which would be of economic value in agriculture and animal-rearing.' (Worsley, 1997: 90) However, the farmers' knowledge is acquired through lived experience and that of the scientists predominantly through formal training.

> '… the local knowledge that is unique to a given culture or society contrasts with the international knowledge system which is generated through the global network of universities and research institutes.' (Warren *et. al*., 1995: xv)

In their discussion and literature review on 'Knowledge, Power and Agriculture' (1994), Scoones and Thompson go some way towards acknowledging the issue. They contrast agricultural science, as a division within the sciences and characterised by positivist science ('thought to show "superior" qualities'), with rural people's knowledge (RPK). They review the theoretical perspectives in development thinking and agricultural research practice, recognising the various ways in which power is exercised in these practices, the goal of which is to bring about change in the interests of different actors. In forming their conclusions they are content to advocate 'an effective and equitable partnership between RPK and formal knowledge systems through adaptive, people-centred, agricultural research and extension practice' (a paradigm which they call '*Beyond* Farmer First'). (Scoones and Thompson, 1994: 17)

Further on in the same article Scoones and Thompson express their hope that 'more theoretically rich and politically sophisticated' arguments in this domain might serve to convince those who dismiss the value of RPK. Yet they do not note that these same 'sceptics' are those very influential people who defend the 'superior' qualities of formal 'scientific' knowledge. The approach of Elizabeth Cromwell and her colleagues (2001), which is discussed above in part 1 of this chapter, is surely more politically sophisticated in that they do recognise and name 'conflict'. In recognising that the protagonists on one side

of the conflict include some of the most powerful institutions in the world, Cromwell's guarded optimism for 'countervailing changes' [21] begins to suggest a more realistic agenda for future action. (Cromwell *et al.*, 2001).

There is also a difference in what is *valued*. A major casualty of the process of agricultural modernisation, of which the interaction between small farmers and agronomists is an important part, is the loss of genetic diversity in manioc - valued, on the whole, by the former and devalued, on the whole, by the latter.

In the four case studies with which we are concerned , although there is not always overt antagonism between the classes, their divergent motivations and philosophies are actively promoted by the agronomists and more passively, or rather defensively, by farmers, *and* they constitute an ongoing source of difference. The fact that there is so little common understanding between family farmers and agronomists - and indeed between family farmers and botanists - is significant. The unreconciled differences militate against the prospect of a viable future for agrobiodiversity in manioc, which for generations has been in the hands of the farmers, with all the negative consequences that would follow from such cultural and scientific loss. The degree to which the scientifically trained do not really understand the farmers' system of plant classifications, or simply raid them for the naming of individual plant varieties, ill serves the cause of what Edna Castro calls 'cultural heritage' in Brazil (1997), both the human and the biological heritage. And it ill-serves family farmers. This is an issue that is taken further in Chapter 5. [22]

[21] The countervailing changes noted by Cromwell *et al.* (2001) include: (i) the end to the global system of agricultural subsidies promoting industrial-type agriculture; (ii) the increased voice of consumers, farmers and CSO's; (iii) the increasing recognition of cultural values and indigenous technical knowledge in international treaties such as the CBD; and (iv) the increase in the number of treaties promoting conservation, sustainable use and benefit-sharing in agricultural biodiversity.

[22] The kind of communication that takes place between extension agents and small farmers, and that may actually be *non*-communication, is evoked by Virginia Nazarea in describing an encounter that she had with a farmer in a rice-growing area of the Philippines. 'He .. revealed that he followed most of the prescriptions of the extension agent regarding his farm but did not exactly understand all that was needed in terms of fertilizing, weeding and pest control. He shrugged his shoulders, philosophically, and added, "You know, those who know more find pleasure in making things more and more difficult." I wanted to assure my friend that what he knew was not any *less*, it was *different*, and probably in his situation *better*. Yet he and others like him will always think that their knowledge is not on a par with the more technical expertise of the extension agent. On second thought, if I know [him], even his comment probably had another deeper layer of meaning. This was his "public script" - spoken tongue-in-cheek - meant to placate but also to probe the forces in a scheme of things he had little control over. His remark was meant to create an impression, trusting me to sort out, at the same time, "what the jest is worth." In a small farm near [this farmer's] property, his neighbour was planting the recommended green-stalked, high-yielding variety (on which his creditworthiness in large part depended), but cleverly hidden in the middle of every clump, unknown to bank officials and extension agents, who rarely get their feet wet in the rice paddies, were the purple-stalked fragrant varieties that his neighbour desired.' (Nazarea, 1998: xii)

The specific debate about classification, which is developed in Chapter 4 in relation to manioc, illuminates another difference between farmers and the scientists and extension agents - that of different philosophies of nature. I do not intend to enter into that contemporary debate about nature - global nature, the privatisation of nature, nature and the commons, nature and society - but for the purposes of this discussion about knowledge and classification, one key study addresses the classificatory activity of primitive societies (sic). Durkheim and Mauss (1903) argue that

> '…classifications are [thus] intended, above all, to connect ideas, to unify knowledge; as such, they may be said without inexactitude to be scientific, and to constitute a first philosophy of nature.'

The same could be said about the activity of people from various realms or fields within the scope of this study. Their different systems of classifications constitute *divergent* philosophies of nature that are defining features of cultures, including those of formal science, and that are handed on from one generation to another. Recognising that this is so helps us to make sense of the contradiction between the different systems of knowledge and between different systems of plant classification.

Human motivation and practice

Another insight, which is highly relevant to this research and which we owe to Bourdieu, is his contestation of the conventional economists' formulation whereby agents are supposed to be essentially rational and calculating, on the assumption that these motives determine their behaviour. It is an easy transition from this viewpoint to believing that the rational agent, or *homus economicus* (economic man), wants above all to maximise his or her money income. I return to this point later when discussing distribution and exchange. This conventional formulation gives us rational choice theory, or what Bourdieu called 'rational action theory'. (Bourdieu, 1990: see Jenkins, 1992:73 for discussion) This theory conceives of agents as making decisions individually and consciously whereas in this study I argue that farmers actually make their choices in the context of specific local histories in which they as individuals, like their parents and previous generations before them, share and shared. Here too, just as with classification systems, the agronomists are subversive of 'traditional' agri-culture: they are the advocates of rational choice, in favour of high yield and higher incomes and often ignorant of the farmers' own cultures. Agronomists act to change rural societies and, without necessarily so intending, act also to create new or enhanced class divisions, as,

for example, when *some* farmers in a given area acquire more land and higher incomes and others lose what little they have and become labourers on other people's landholdings. [23]

Chapters 4-8 are replete with examples of the manner in which family farmers are constantly strategising, not only to reproduce the structures of their society, thus guaranteeing their social reproduction, but to change those structures where and when necessary and to adapt, in their own interests, to the structures of the dominant segment of their national society and of the dominant economy. As we have seen, there are significant differences between the 'knowledge systems' of farmers and of those influential outsiders, notably the agronomists, who are also concerned with the manioc economy. It is through understanding the accustomed world or *habitus* of the farmers, attuned as this is to past histories, that we can come to terms with the motives and methods that they use in the classification and naming of the different manioc varieties. In Chapter 3 I describe and discuss the methodology for the whole study. This has featured a mode of investigation that entailed entering into these local worlds. In Chapters 4 and 5 I examine how the concepts combine with empirical investigation to enable an exploration, successively, of the different classification practices for manioc varieties and of the past and contemporary status of agrobiodiversity.

PART 3

THE MANIOC CHAIN

Having considered in turn issues of agrobiodiversity and classification systems, I now examine the kind of economy that is constituted by the practices of the small farmers, the social relations in which they are engaged and the ways in which they provision themselves, their families and their communities.

I have adopted the classic political economy schema that is derived from the early political economists and from Marx and that is used by the economic anthropologist Susana Narotzky in analysing the findings from her fieldwork, which is about the olive oil producing community of Catalonia. This has enabled her to engage with the social and cultural relations that are

> 'involved in the production and reproduction of material life, through the organised interaction of humans and nature…. (starting with) the 'classic' analytic division of

[23] This phenomenon was apparent in the Alagoinhas area of Bahia, which was the site of a 10 year international development programme designed to improve manioc farming. It is discussed further in Chapter 6.

> the economic process into the distinct moments of production, distribution and exchange, and consumption.' (Narotzky 1997: 7). [24]

Using this schema, we are able to identify the integration of the separate components of the manioc economy and to view it as a whole. [25] This is important since we need to be able to

> '…link the consumption and the production ends of economic life in order to address vital issues such as food security, housing, health care, education and, more generally, public or collective consumption.' (Narotzky 2004: 1)

As Narotzky points out in this same article, recent work on food security and 'food paths' (in the sense of the actions that have to be undertaken in order to make food available to particular domestic groups) has demonstrated that local knowledge is crucial to determining food security levels, along with other factors such as access to land, distribution practices and cultural views about food consumption. Local knowledge includes what farmers know and do to sustain genetic diversity in food crops, along with what they and their families know about the diversity of the foods that they produce, give away or exchange and, finally (with these others), consume.

The traditional provisioning system in which most manioc farmers are involved – and which is so different from that of the agricultural modernisers – has a profound impact upon both

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[24] Narotzky agrees with Karl Polanyi (1957) and other economic anthropologists like herself that there is an important distinction to be made between two meanings of the words 'economic' and 'economy'. One of these meanings is indicated as 'formal' and the other as 'real' or 'substantive.' (Narotzky, 1997: 2).
'Formal' means that people's specifically economic behaviour is to be understood as a theory of rational action: people choose, according to the best information available to them, between alternative uses of scarce resources and they do this so as to maximise the benefits to themselves, notably of income and wealth. This immensely influential theory explains that the way in which the host of rational *individual* choices is translated into the *collective* entity that is an economy (whether local, regional, national or international) is through the mechanisms of the market, which performs so as to allocate resources of various kinds - notably land, capital, labour and commodities. According to this view, the market will work efficiently, largely through continuous price adjustments, provided it is not subject to inappropriate interference. The model of human behaviour is that of *homo economicus.*
The 'real' or 'substantive' meaning is very different. It indicates that the economy is *not* separate from society but is an aspect of it and is to be understood socially and culturally. The economy is defined as 'an institutionalised interaction between man and the environment that provides a sustained provision of material means for the satisfaction of wants. Satisfaction of wants is "material" when it requires the use of material means to obtain the ends.' (Polanyi, 1957: 293, cited in Narotzky, 1997:2-3).
Following on from Polanyi's distinction, a number of anthropologists and other social scientists have analysed 'economic behaviour' as being, at one and the same time, thoroughly *material* - for example, in how technology is used in combination with land and labour to ensure production - and also *cultural*, in the sense of human practice, of what people do, act and think as they go about these tasks and communicate with one another. According to the 'substantive' position, what we label as 'economic' is, *ipso facto*, also 'cultural'. From this standpoint the 'formalist' position represents a distortion of real life, an abstract model of 'economic' behaviour that is divorced from its cultural setting and from the social meanings that people ascribe to their own actions.

[25] 'The result we arrive at is not that production, distribution, exchange and consumption are identical but that they are all members of one entity, different aspects of one unit. ….A mutual interaction takes place between the various elements.' (Marx, 1857-8 cited by McLellan, 1977: 351)

the quality and the quantity of the food crop and of the foods. The external pressures that confront farmers, and the changes to which these pressures give rise, occur at different points or stages in the food provisioning system. Yet changes at any point impact across the whole system.

> 'The social relations in these various factors will create particular topographies of food provisioning, as people deal with the options at hand from within their (and their household's) position in the economic and political structure.' (Narotzky, 2004: 6)

This is not to say that small farmers do not accommodate to and thus gain benefit from external factors, through their own adaptations. Yet their involvement in producing for the market is highly problematic, given that markets - as part of the distribution system - have a regulatory function. This is a point that I will return to in Chapter 8.

The schema facilitates our analysis of the organisation of production, both of the crop and of the food. The whole sequence - production of the crop and of the foods and the distribution, exchange and consumption of the foods - comprises the *Manioc Chain.* The Manioc Chain can be conceived of as being joined end to end - joined at the point where what happens with the supply of and consumer demand for the foods in local and more distant markets feeds back into the production decisions that are subsequently made by farmers – including the decisions that they make to sustain and extend or, alternatively, to modify and to reduce the number of different crop varieties that they grow in their *roças*.

Narotzky's emphasis on the significance of economic transactions does not make her a believer in *homo economicus.* Hers is a diachronic rather than a synchronic account. [26] In other words, social and economic relations are to be understood not as a 'snapshot' but historically. She insists that economic transactions are embedded in the cultural sphere and she also shows that human agency operates creatively - *strategising* - within constraints that are historically produced and collective in character but that the individual interiorises. This is in contrast to those theorists who treat human beings as the 'bearers' or 'supports' of economic and social structures. [27] In this sense Narotzsky echoes Bourdieu with his concept

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[26] The diachronic - historical - account is essential if we are to make sense of how the relationship between relatively isolated communities and the outside world changes over time. 'A historical perspective is fundamental to all attempts to place local regions within a world system. … It should be clear that the nature of the relationship … changes over time.' (Roseberry, 1989:116)

[27] Structuralism has been defined as 'a meta-theoretical position that explains individual behaviour by social structural dynamics such as markets, social classes, populations and organizations.' (Seidman, 1998:152) This position is antithetical to those other positions that emphasise human agency and that regard people as 'making their own history', and making sense of their own history, operating under constraints but seizing hold of opportunities.

of the *habitus* as well as the historian E P Thompson who, without explicitly stating it in this context, is in fact referring to a process which ensures the social reproduction of a community or society. (Thompson, 1995)

> 'Values are neither "thought" nor "hailed", they are lived, and they arise within the same nexus of material life and material relations as do our ideas. They are the necessary norms, rules, expectations, etc, learned (and 'learned' within feeling) within the *habitus* of living; and learned, in the first place within the family, at work, and within the immediate community. Without this learning social life could not be sustained, and all production would cease.' (Thompson, 1995: 175)

Production

The production of manioc and *farinha* in the two Pará case study sites, in Deborah Lima's words is

> '…one of the most important aspects of domestic life.…The requirements for planting *roças* and for processing the manioc into flour - access to land, to labour, to instruments of work - are a matter of intense negotiation, resulting in arrangements that are temporary and involve economic differentiation….The people's open conception of kinship relatedness reflects the fact that agricultural productivity and land rights are both the result of labour.' (Lima, 2004)

Lima's observation was about an Amazonian community near the town of Tefé in the mid-Solimões. Although far away, this observation equally applies to the communities where this research was undertaken in Pará. The central significance of the production of manioc, as well as the emphasis on the family and on labour, is less pronounced in the Bahian case study sites because agricultural modernisation has impacted more forcefully in that state. Nevertheless, Bahia still remains similar to the Amazonian sites as described by Lima.

Conventional economic analysis has viewed production as being orientated towards the market.

> 'The economic organisation of Western societies was [seen as] structured around production processes, taking the market as the nexus between production and personal consumption. The new emphasis, instead, proposes to think about people first, about their ways of earning a livelihood. …. The family, relatives and friends, neighbours and the local community have been stressed as networks of economic relations, covering formal and informal production processes.' (Narotzky, 1997: 39)

The traditional subsistence-oriented mode of manioc is highly skilled. The farmers design and develop the labour process, possess the requisite skills and own the instruments of production. These can be simple but they are suited to task. As Narotzky points out, those who control the design of the labour process have overall control. Yet there is a low degree of recognition of the skills of small farmers in the formal education system in Brazil. This neglect is matched by the complete lack of interest of many of those whose priority is the promotion of agribusiness or 'modern' agriculture. This applies equally to Bahia and to

Pará. Moreover, for the most part (although there are exceptions) the food products are not valued other than by the class of people who are the main consumers of manioc foods in the north and north-east of Brazil. The level of production is not adequately reflected in local or national statistics, and this simply because of the weaknesses of the survey methods. [28]

There is also a significant issue about quality. In their penetrating, yet partial, study of the agricultural economy of the north east of Brazil (Kutcher and Scandizzo, 1981) the authors noted that 'the bulk of production' of the staple crops, beans and manioc, never reached a formal market or processing centre. They concluded:

> 'Fully 47 percent of crop output is from subsistence types of crop - rice, corn, beans, manioc, bananas, potatoes, tobacco and coconuts. These crops are inferior goods, produced largely for on-farm consumption or for the local market because their quality is too poor for exportation.' (*op.cit.*)

The concept of 'quality' in this context is problematic. How and by whom are these judgements being made, and in which context? For example, does this statement refer to consumer preferences in regard to taste and colour and if so, which consumers? It is questionable that, at least in the case of manioc or *farinha*, the reason for any non 'exportation' or marketing should be due to poor quality. This phenomenon of conventional economists and planners simply ignoring or not attributing any value to the produce of rural people is common in developing countries. Cromwell and her colleagues (2001), in their global review of agrobiodiversity and livelihoods, also noted that much of what farmers grow is not sold in commercial markets and thus is not conventionally valued (see Chapter 8). Such produce is not valued and is also under-reported or not reported at all in statistical accounts of production. This under-reporting and non-reporting not only ignores rural production for subsistence and local market use but also ignores the produce of the back yard, both in rural areas and in small towns. This is the product of the women's realm *par excellence* and is important for the family diet.

There is also a conventional view that small producers are economically inefficient in their use of land. [29] So, for example, in the official commentary on the results of the agricultural census of 1996, published by IBGE, we read

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[28] Annual production, yield and other such statistical data is collected at the municipal level to estimate the Municipal Agricultural Production (PAM). My interviews with local authorities and extension agents in the four case study sites demonstrated that these figures are offered to census enumerators on the basis of very approximate estimates. However, statistical data is more reliably collected from 'modern' farms where farmers and landowners themselves have more quantitative information at their disposal.

[29] Writing about India, Vandana Shiva criticises what she calls 'the false assumption' that the small farmer is unproductive. Citing FAO's World Census of Agriculture, 1980, she notes: 'In Brazil, the productivity of a 0-10ha farm was $85/ha while the productivity of a 500ha farm was $2 per ha. In India, a 0-5 acre farm had a productivity of Rs 735/acre while a 35-acre farm had a productivity of Rs 346/acre.' (Shiva, 2002:53)

> 'To conclude, in Brazil we had on one side a poor performance of traditional crops, produced with primitive means and having low productivity, and on the other, a steady expansion of some commercial crops, aimed at domestic and foreign markets.' [30]

Very different results can be obtained, depending on which measure of efficiency is adopted. The input unit can be time - the labour time expended - but it can just as well be land or money. A market-oriented measure of economic productivity may exclude such costs as the degradation of soil and water supplies. (Narotzky, 1997:13) Also excluded from the formal accounting may be workplace and environmental hazards such as the health losses being borne by local populations, infrastructure costs such as irrigation projects, which may be defrayed by state or federal governments, or the overall costs of the whole process of crop production and of food processing and distribution. A quite different way of doing the accounting is suggested by José Lutzenberger, once Brazilian Secretary of the Environment and always an environmental campaigner.

> 'If we want to compare the traditional farmer with the modern-day farmer we must compare the systems. How is food produced then and today? Modern economic macro-accounting doesn't make this kind of calculation. The different industries are seen as different parts of the economy and in the gross national product only money flow is compared. If we compared the complete systems we would certainly find that today, also, at least 40% of all working hours are for production and distribution of food…. Overall, we haven't really gained very much in terms of man-hour efficiency. What we have is a different distribution of tasks and a tremendous increase in environment costs.' (Lutzenberger, 1995:6)

The heart of the problem, as will become clear in subsequent chapters, is that influential outsiders too often divorce their advice on specifically 'economic' matters from the externalities that Lutzenberger refers to *and* largely ignore the cultural worlds in which farmers' practices are located and through which they acquire their meaning.

Distribution and exchange

Distribution provides the bridge between production and consumption. It takes place in different ways. One of these is through exchange in markets places that in the case study areas may be anywhere on the spectrum between the local market of a very small town and a distant, sometimes externally regulated, market in a city or large town.

Exchange may be regulated in any one of a number of ways. These include the operation of networks based on shared first-hand knowledge of the goods or services in question. This intimate contact between sellers and purchasers was very common in the exchange

[30] Traditional crops include the four main staples, beans, manioc, maize and rice, but the category also implicitly alludes to methods and organisation of production.

relationships in all four of the case study sites where, for example, those who purchased *farinha* in local market places had strong preferences for particular types of the product - yellow or white, crunchy, fine…depending on their taste and, frequently, depending on where they were from. [31]

The type of exchange relationship, even when money was being exchanged for goods, that involved reciprocity and redistribution was still common among most of the farming families that I encountered during this research. Yet in those areas where, for example, *farinha* was purchased by traders directly from the farmers/producers (with the necessary transport that farmers did not possess) the trader and farmer each had a different experience and thereby a different concept of the transaction. The trader stood to make good profits whereas the small-scale farmer, who, in many cases still remembered and believed in the 'moral economy' referred to by E. P. Thompson, was self-exploitative (Thompson, 1971). Farmers worked very long hours for minimal return.

Only very exceptionally did farmers sell manioc stick cuttings for planting. For most, this type of transaction was morally unthinkable just as it is unthinkable in other societies to sell seeds. This type of item like seeds, vital to the material survival of any rural community, is commonly circulated through a system of reciprocal gift exchange. Johan Pottier (1994), who has studied farmers systems in Rwanda, observed that farming families experiment with interesting varieties of beans, the local staple crop. Then, and only when the plant is known to be of value, seeds (and the local knowledge which comes with them) will be given in exchange for favours to close friends or neighbours. Pottier observes that this type of exchange is especially important for very poor farmers as it relieves them from having to rely on the market as the source for seed materials. [32]

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[31] In his paper on the emergence of alienation in retail trade, James Carrier (1994) contrasts E. P. Thompson's concept of the 'moral economy' with Adam Smith's concept of 'political economy'. (Thompson, 1971) 'Changes in trade practices and understanding in the period around 1800 were part of a more general espousal of the idea that economic relations and activities ought to be differentiated from personal identity and durable social relations and obligations….Trade was not seen as differentiated from social relations more generally, but was coupled and subordinated to them.'
Carrier continues by citing Crowley's analysis of economic thought in colonial America
' "It was the traditional view that exchange…was a social matter involving reciprocity and redistribution: competition, in the sense of one man's gaining at the expense of another, was a violation of this traditional ethic." ' (Crowley, 1974:6, cited in Carrier, 1994:364)

[32] In India, a campaign to oppose the National Seed Bill that was lead by the farmers' organisation of the ruling Congress Party had this to say: 'The National Seed Bill should not put any infringement on the indigenous and traditional rights of the farmers to grow, breed, multiply, exchange and store seeds and be prevented to carry on the age old and time-tested barter system for mutual benefits of the fellow farmers. Farmers should not be treated as traders in the proposed bill.' http://www/grain.org/bio-ipr 12 April 2005.

Some theorists have thought that using money as the medium for transactions involving buying and selling in markets has a transformative effect and that it breaks down old bonds of social solidarity. In fact, a range of anthropological studies shows that money as a means of exchange existed long before the development of modern capitalism and that it is not necessarily subversive of social solidarities of various kinds, including obligations of a non-competitive and non-monetary kind. (Parry and Bloch, 1989:7) Mark Harris, in his discussion of the agrarian question in riverine Amazônia, reports that the people of the floodplain community of Parú '…associate the introduction of money with current problems of high prices, inflation and poverty.' (Harris, 2004:90) However, it is open to question in what way and to what extent these problems tend to undermine social solidarity in the sort of rural area where Harris worked or in most of the communities in my four case study areas. I suggest that it is changes in the production and the distribution of basic products, rather than the introduction of money *per se*, that challenge local solidarities.

Supply and demand operate in farmers' trading relations when they come to sell their surplus manioc food products, both when they interact with larger and more impersonal markets and when they engage directly with local small-scale markets. In the first case farmers will deal with traders, who operate as intermediaries. It will be the traders who are the better informed about variations in prices for the foods in places that the farmers may rarely if ever visit. Yet in the smaller and very local markets other factors are at work. These derive from the simple fact that 'the market place is a specific site where a group of buyers and a group of sellers meet.' (Bohannan and Dalton, 1971 cited by Narotzky, 1997: 52)

Given this direct contact, buyers and sellers mostly will know each other and probably will know also about the quality of the goods that are on sale. The point is that trading relations take place in a context of social relations in which trust is built up over time.

> '… knowledge of the other's personality, family, history, church and so on is relevant to the trust one has that the exchange will be satisfactorily completed. The riskier the economic environment, the more traders need additional information about a partner over and above the specific facts of the proposed deal.' (Plattner, 1989: 211)

Local markets function not only as places for exchange but also as generators of shared meanings, of the experience that sellers and buyers alike have of the different foods, of the distinctions that they make based on *taste.* For as long as the farmers/producers of this current study can retain some control over their exchange process, they are able to take advantage of these shared meanings in the exchange relationship and thus remain viable in an otherwise hostile economic environment. If we stand away from the situation of the

individual farmer, or community of farmers, and look further afield what we will often find is that, *in combination*, these small-scale producers are supplying not only rural but also large urban populations through direct marketing and/or the involvement of traders. Such provisioning, when it occurs, is achieved on a day by day basis, sometimes over long distances, and of necessity on the basis of a regular and reliable supply. The analysis of my fieldwork findings in Chapter 8 will show to what extent this is happening in the case of manioc and its food products.

Consumption

> 'The measurement even of basic need for food turns out to be a lot more problematic than many politicians and social scientists have traditionally assumed. The amount and cost of the food which is eaten depends on the social roles people play and the dietary customs observed as well as the kind of foods made available socially through production and availability in markets. In short, food in all kinds of society is "socialised" '.(Townsend, 1993: 31)

Those specialists who are concerned with agriculture or the conservation of genetic resources or the production of food (undifferentiated food commodities), so as to meet the perceived food requirements of developing countries, are not known to take an interest in the power of food cultures at local level in these same 'developing countries'. Those institutions and thinkers who do concern themselves with local 'food security' do not discuss food culture. .[33] However, discussion and study about food culture has become fashionable in recent years among middle class consumers of British Sunday newspapers. The ground-breaking study by David Bell and Gill Valentine (1997) on food geographies analyses aspects of food in Western metropolitan society which, while insightful, is only occasionally relevant to our discussion of the manner in which producers of manioc in Brazil manage this food. The reason that this neglect of local food cultures matters in development studies is that it implies lack of interest in an element of culture which is intrinsic both to rural people's survival and to social and material reproduction and which needs no input from the outside. The sociologist Stephen Mennel and his colleagues (Mennel *et al.*, 1994) recognise this gap in the literature and provide us with a useful digest of some studies on the subject of eating, diet and culture. In this study, I want to broaden the discussion by relating it to the realm of small farmers in Brazil.

[33] A competent collection of papers in the issue of food security in Africa published in 2002 is just one example of thousands that we might select where food culture is simply ignored. (Devereux and Maxwell, 2002) However, a project funded by the EU in West Africa which still continues where the Natural Resources Institute (NRI) provided consultancy, worked with women who make market foods from manioc. This project is exceptional.

Foods are consumed, more often than not in households. The conceptual device of the Manioc Chain enables us to recognise that the choices that small farmers and their families make with regard to what they consume are intimately connected with what and how they produce: the food crop and the foods that they produce from it. Most food is consumed in meals where members of the same household eat together. Both everyday and festive meals have social significance. Potentially convivial events, meals are the key expression of food cultures. Yet, as Mary Douglas pointed out, there are no universal food meanings but, instead, only ones that are particular to particular households and to particular communities. Meals are patterned, with meals spaced throughout the day and also through the week and - if we take feast days and other special events into account - throughout the year. (Douglas, 1971)

The informal subsistence economy of the small farmers is, then, constituted primarily by *households*. Within households the production and the consumption functions intermesh. Thus it is primarily women who process the foods and who carry out the final stage of preparing the food - the cooking and serving of family meals. Being outside the market, the things produced on the farm and consumed are not commodified. The values created are for use and not for exchange - certainly for sustenance but also for the maintenance and social reproduction of the household. And this is the shared experience that people allude to either amongst themselves or as they try to describe their way of life to an interested outsider. Raymond Williams, in his reflection on the subject, referred to the reality of change. Tastes and values are always changing. They are not static. Change, as it occurs, is a shared experience within the family and household unit.

> '…For what we basically say, in any kind of communication, is: "I am living in this way because this is my experience." … Since our way of seeing things is literally our way of living, the process of communication is in fact the process of community: the sharing of common meanings, and thence common activities and purposes; the offering, reception and comparison of new meanings, leading to the tensions and achievements of growth and change.' (Williams, 1961: 54-5)

For Bourdieu the consumption of food is the realm of necessity for the working class, as against one where 'necessity' takes the trappings of form and appearance for the middle class and the bourgeoisie. However, necessity still is to be enjoyed, even though clearly Bourdieu distances himself from any appreciation of working class food.

> '… necessity can only be fulfilled, most of the time, because the agents are inclined to fulfil it, because they have a taste for what they are anyway condemned to.' (Bourdieu, 1990a: 178)

In *Distinction* (*op.cit.*,1990a) Bourdieu does not deal with people who grow and process their own food. Yet he makes it abundantly clear that there are separate class-based food

cultures that, along with other aspects of everyday living, are replete with stated and unstated meanings about different lifestyles. These meanings customarily can be conveyed by the written or spoken word as well as graphically, but the words and pictures refer not only to what can be seen and heard but to the full range of sensory experience. Smell, taste and touch are deployed along with sight and hearing. Multi-sensory experience is conveyed by memories. The very possibility of making a judgement and acting on such judgement is based on this capacity to remember, as Aristotle made clear long ago.[34] What we apprehend through the senses is commonly communicated by texts of various kinds, including academic texts. Thus words - whether written, printed or appearing on a computer screen - become a surrogate for multi-sensory experience. There are advantages, because many of us want to create records and to exchange with others in writing. Yet there are also disadvantages:

> 'Writers do not communicate their messages by the direct manipulation of sound, gestures, images or scents. Today we certainly have not abandoned these forms of expression - we still speak, sing, gesture, dance and so forth - but we have shifted them from their former position at the centre of our cultural universe to a distinctly secondary, more restricted role. They are rarely welcome in our world of "serious" intellectual communication, and when they do appear there (for example, in liturgy or theatre), they are strictly regulated by written scripts.' (Hibbitts, 1992:4).

There is the closest association between the sense of smell and the sense of taste and of both with eating. As Hibbitts points out, the sharing of food and drink customarily conveys feelings of friendship and approval. The problem, when meaning is being communicated through a text (as it is with this study), is that it will be *read* but not experienced and internalised as would be a meal, for example. The anthropologist David Sutton tackles the problem head on in *Remembrance of Repasts: an Anthropology of Food and Memory*. He recounts the 'sardonic comment' of a fellow academic after he had presented a paper to the department of anthropology at Oxford.

> 'Food and memory? Why would anyone want to remember anything they had eaten?' (Sutton, 2001:1) [35]

As Sutton points out, memory can be constructed not only individually, as when we recall some episode from our personal past, but also collectively through the sharing of memories. Thus Sutton's subjects, who are the inhabitants of the Greek island of Kalymnos, 'eat in

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[34] 'All men by nature desire to know. An indication of this is the delight we take in our senses. … By nature animals are born with the faculty of sensation, and from sensation memory is produced in some of them, though not in others. Now from memory experience is produced in men; for the several memories of the same thing produce finally the capacity for a single experience.' (Aristotle, 1998)

[35] Sutton's only encouragement came from colleagues working in Greece or other Mediterranean countries. They would share recollections of the meals they had once eaten.

order to remember' and Greek immigrants in the American West, re-encountering the smell of fresh basil that once they had experienced in their mothers' kitchens, would breathe in the piquant scent, murmuring '*Ach patrida, patrida*' (homeland, homeland).' (Sutton, 2001: 74) These memories are all about family and belonging. They are about distinction, but in a different sense than that referred to by Bourdieu in his book of that name. The distinction is not between different food cultures but between different tastes within a food culture. The food of necessity in all its manifold varieties, which in Brazil traditionally is *farinha*, does not become any the less interesting as a topic of conversation simply because of its familiarity, any more than does bread in France.

Families and communities become 'aficionados of taste', perhaps keeping back the best for their own consumption and for that of close friends. Frequently during fieldwork, I observed and was told that the best *farinha* would be reserved for the family. Alternatively, as when a food is specially produced for sale as well as for household consumption, the aficionados of taste become the customers, who will have their own culinary preferences and who will search out this or that market stall so as to buy the particular food, prepared in such-and-such a way with specified ingredients. The local markets, in this context, remain meeting places where the transactions are personal and meaningful.

> 'Thus we can speak of a "common cuisine", defined by Mintz as a shared community of people that eats similar foods "with sufficient frequency to consider themselves experts on it. They all believe, and care that they believe, that they know what it consists of, how it is made, and how it should taste." '(Mintz, 1996:96 quoted in Sutton, 2001: 107)

Like any other aspect of culture, food culture is vulnerable to market-induced change. Carole Counihan, who has done research in Sardinia, notes what can happen:

> 'with the decline in local primary production and the increasing reliance on the market, the incessant mutual giving and receiving of foods slows and becomes less crucial to survival. Thus one of the most important forces in linking people together - reciprocal prestations - is fading away, and with it goes people's interdependence.' (Counihan, 1984:53)

Food memories sustain identities and have solidarity associations - including ones of place - as when

> 'the food event evokes a whole world of family, agricultural associations, place names and other "local knowledge." ' (Sutton, 2001: 83)

Perhaps these associations are most strongly felt in the presence of strangers. I can still remember the stunned silence when on one occasion during my fieldwork I explained that we did not have manioc or *farinha* in my own country. What I realised I did not know

through my own experience, and what they *did* know, was a reminder of the singularity and value of their food culture, familiar as it was to them and strange to me. Their gifts of food, whether to the stranger amongst them or to their more familiar friends and neighbours, left no material memento but can be recalled through memory. Their giving and my receiving was part of a process of discovery of another culture that involves every different activity within the Manioc Chain.

The Manioc Chain as a concept

The utility of the Manioc Chain as a conceptual device is twofold. First, it enables us to draw on a tradition of thinking that addresses what people do as they produce, buy, sell, give and consume as being at one and the same time 'economic' and 'cultural'. Secondly, it helps us to understand the unities, connections and feedback that are to be found in this sequence of activities as people strategize within constraints that they may, or may not, be able to change.

CONCLUSION

At the beginning of this chapter, I expressed a hope that out of theory a change of practice might take place. The chapter has attempted to push beyond the boundaries of traditional thinking about rural society and its relations with a major food crop. The purpose of these reflections has been to analyse how we might better understand the intimate and everyday aspects of small-scale farming societies by bringing together thinking from different disciplines but always with a single question in mind. The question is about the genetic resources of manioc, the agrobiodiversity within this crop, which is created by the work of family farmers and which is maintained and managed thanks to their knowledge and to the quiet, everyday exigencies of a culture that features this liking for manioc food and that needs it for its material reproduction.

From Chapter 4 onwards we move into the empirical domain to explain and discuss the findings of the fieldwork. This puts flesh on the theoretically-oriented discussion in this chapter. But first, in Chapter 3, we turn to methodology, to the design of the study and to the *how*, *what*, *when* and *where* of the fieldwork.

CHAPTER 3

METHODOLOGY

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INTRODUCTION

The introductory chapter sets down the research questions. This chapter shows how I went about answering them. The research has centred on what rural people actually do, within a constantly changing socio-economic context to which they adapt, in different ways and with different results. The research questions all relate to the knowledge, memories and practices of small farmers and their families. It was therefore essential that I should carry out a considerable period of fieldwork in Brazil, over nine months, so as to find out directly - principally from the farmers themselves - the *why, what, how, who, when* and *where* of farming practices.

The methodology and the methods that I selected and the choice of places to visit were all influenced by the focus that I had established well before the first scoping phase of the fieldwork. This pre-determination had five different aspects. My own previous experience in Brazil, over a fifteen year period, helped form a foundation for the research.

First, I was interested not so much in agriculture *per se* but specifically in manioc, M*anihot esculenta* Crantz. In adopting a methodology, I had to ensure that it would enable me to meet with farmers for whom manioc was their main, or at least a significant, crop. My research questions related to the whole Manioc Chain, not just to the production of the crop but also to the production, consumption, distribution and exchange of the foods. Thus I needed to meet not only with the farmers, men and women, but with other members of their families. I had to meet with others also who knew them well. Some of these other informants might live in or have roots in the communities and others might be knowledgeable and sympathetic outsiders.

The research questions are about the practices of women in their kitchen gardens, of small-scale farmers in their *roças* and of them and of other members of their families in the *casas de farinha.* The quality of information that I could gather in the communities was transformed by the close encounters that I had on site with rural people who would talk with me, explaining things that they might not have previously articulated in quite this way, and probably not to any outsider. This would happen even as we walked together through the *roça* and examined some interesting new plant or as I visited the *casa de farinha* as they

went about preparing the various manioc foods - *farinha*, *beijú* and starches - explaining the various techniques as they worked or as we chatted in people's homes. I set out the nature of the enquiry as 'close encounters' in Part 1 and describe the actual process of enquiry in Part 2.

Secondly, the research question about change within living memory meant that older people, with their memories of how things were and of how they had changed over the decades, were amongst my key informants. This is the classic ground of oral history the techniques of which I employed, not only for older people but for all my informants in rural communities. I also drew on Pierre Bourdieu's approach (Bourdieu 1999a and 1999b) both by 'active and methodological listening' and identifying the ways in which farmers 'strategise'. To a lesser extent and in modified form I drew on the work of Robert Chambers and his peers. (Chambers, 1992, 1994 and 1997).

Thirdly, even to be able to start the fieldwork I was reliant not only on my own past knowledge of and contacts within Brazil but also on being able to identify key institutional partners through whom I could learn about and be introduced to the communities. It was partly through such contacts with sympathetic institutions that I was also able to find out about the knowledge and practices of agronomists and of other external agents as these relate to the world of the small farmers.

Fourthly, in formulating the research questions I gave great emphasis to cultural exchanges within families and communities over time. This meant that I was interested in cultural memory, in how knowledge and skills are transmitted between rural people in local communities and over generations. As we saw in Chapter 2, these communities simultaneously look inwards and outwards. In practice, I had to locate my fieldwork not in individual and isolated farms but in different communities where there were many manioc farmers.

Fifthly, to answer the research questions I had to find out about the different manioc varieties, and their morphological and economic characteristics, as they were being grown *in situ* by the farmers. The combination of conversation and direct observation that I have noted above was indispensable to my being able to find the detailed answers. These answers reflected the 'knowledge world' of the farmers and contrasted with that of the agronomists and their scientific colleagues. The theoretical orientation is explained in Part 2 of Chapter 2.

This chapter is divided into two parts. The first part presents the research programme, followed by the four key elements of the research strategy: the nature of the enquiry as encounter 'on the ground' in rural communities; finding out - Bourdieu, Chambers and oral history; selecting institutional partners; and the case study approach. The second part of the chapter covers the process of enquiry, detailing the methods chosen for the work and the manner in which these were used and developed to meet the research requirements and to respond to local opportunities. It also deals with the way I approached undertaking the morphological description and the cultural attributes of manioc varieties and the practicalities of research in the *roça* and questions asked of the farmers and other informants about the different varieties.

PART 1 – THE RESEARCH PROGRAMME

The research programme was designed in three phases and carried out between November 2001 and December 2002.

Phase one - scoping

This phase, which took place in Brazil over a period of three months, enabled me to scope and to plan for the main body of the field research in phases two and three. I selected the northern state of Pará and the north-eastern state of Bahia for reasons explained in Chapter 1. There were four objectives, which I specified in advance:

1. To test research hypotheses and research questions in discussion with Brazilian colleagues.
2. To select institutional partners with which to work in the states of Pará and Bahia and to identify individuals with whom I could discuss the methodological framework and research design.
3. To select two case study sites in Pará and two in Bahia in which to conduct the fieldwork in phases two and three.
4. To appraise the social, economic and political context for the project and to establish a network of institutional relationships among manioc and other relevant researchers and government and NGO bodies.

Apart from the time I spent in Pará and Bahia I paid a three-day visit to Paraná, the state which is, after Pará and Bahia, the largest producer of manioc in Brazil and where intensive farming methods are used. I also spent a couple of days in Brasilia to consult researchers there. After completing this work I was able to finalise my research questions, appraise my

research strategy and methodologies and already begin to identify issues for further research which fell outside the scope of this study.

Phase two in Pará

Phase two comprised the fieldwork in Pará and took place over a period of three months, which was mostly spent in the rural areas. The sites, shown on maps 1-5, were:

Site 1. Municipality of Gurupá – the community of Bacá

Site 2. Muncipality of São Domingos do Capim – especially the communities of Catita, Estrela and Belazarhina.

Phase three in Bahia

Site 3. Municipality of Cândido Sales, SW Bahia – especially the communities of Quaraçú, Lagoa Grande and Possidônio.

Site 4. The *Agreste* of Alagoinhas in the municipalities of Alagoinhas, Inhambupe,and Crisópolis – especially the communities of Munducarú, Formoso, Ponto de Beijú and Catuzinhho.

The two case studies in Pará preceded those in Bahia. I spent nearly three months in each state and between four and five weeks in each of the case study sites. I also spent some time in the cities of Belém, Salvador and Conquista as well as with EMBRAPA-CNPMF in Cruz das Almas (BA). In the first site, in the Amazon municipality of Gurupá, I worked almost exclusively in the community of Bacá but also undertook some interviews and visited markets and some gardens in Gurupá town. In the second site I worked in the municipality of São Domingos do Capim, was based in the municipal capital of the same name and stayed for periods of between three to five days in three different communities. I made other shorter visits to these and other communities and farms in the municipality and travelled up river to Belém on a boat carrying *farinha* to market before visiting one of the main retail markets selling this produce. I also had occasion to visit other markets in Belém.

For the first of the Bahian case studies, I was based in the small town of Quaraçú in the Municipality of Cândido Sales in SW Bahia near the border with Minas Gerais. From Quaraçú I made repeated day visits to two nearby villages and visits to other hamlets, farms and *casas de farinha*. I also conducted research in and around the town and in and around Conquista, the destination of many of the fresh roots from the municipality of Cândido Sales and a significant point of reference for regional food culture. For the second case study, I conducted research in an area which crossed the municipal boundaries of Inhambupe, Alagoinhas and Crisópolis and I was based in the town of Inhambupe, three hours by bus to

the north of Salvador. During this time I stayed for three days in each of two rural communities and in the small town of Crisópolis and made day visits to other communities. I also visited the large covered market in Alagoinhas to interview stall-holders, talk to traders and to observe the range and discover the origins of the produce on sale. I also visited a small factory in Lagarto, Sergipe, where equipment for the production of *farinha* was designed and made.

Enquiry as encounter

Choosing a methodology is not just about selecting the most appropriate means to the researcher's aim of 'finding out'. This is because the methodology for an enquiry that involves people in the area of study, and that draws on their local knowledge, inevitably impacts on them and invokes their responses. The methodology becomes interactive and to some extent open-ended. As I was to find, the behaviour and perceptions of the people whom I consulted and their willingness (or not) to engage with me influenced both the choice and efficacy of the methodology *and* comprised part of the research findings.

I was fortunate to encounter people in a number of places that I visited where this ethnographic dialogue was a true exchange. I gained knowledge vital to my research, but hoped that my respondents too might gain from our conversations as I shared with them my knowledge of manioc and food-making in other parts of Brazil. The fieldwork was conducted in the subjects' own terrain and to a considerable extent on their terms. Visits to the *roças* and *casas de farinha* changed the power relationship as the exchanges took place in their familiar known places of work, which previously were unknown to me. The powerful in these exchanges were the farmers and *farinha*-makers and not myself. Yet the overall aim of the research and its construction as a piece of academic work ultimately has remained outside their worlds although I was changed by the encounters.

In conducting this ethnographic dialogue I consciously did not adopt the positivist approach to social research in which the researcher keeps his or her distance and is more concerned with what can be objectively observed of people's behaviours and is correspondingly less concerned about what might be learned of the life-world of the subjects through encounters in 'the field'. As does the positivist researcher, I followed ethically-grounded rules designed to establish trust and good conduct in the gathering of data. Yet the positivist researcher's ethical responsibility is constructed primarily within the scientific communities to which he or she belongs. In contrast, my fieldwork, while still a piece of academic work, was also conducted on the basis of relationship and exchange between the subjects and myself.

I have been concerned not only with cause-effect but also with discerning the understanding of the subjects, who principally are small farmers, and that is rooted in their world and not in mine. Although the outcome of such ethnographic research is described and analysed in this thesis and is intended as a contribution to theory, there are other outcomes such as detailed descriptions of human practices that may well be obscure to, or disregarded by, outsiders and which, to my knowledge, have scarcely been documented elsewhere. Just such ethnographic examples discussed in Chapter 2 are provided in a detailed account of the processes of manioc cultivation by an indigenous people in the Amazon by Carneiro (1983), and also, for example, in Balée's study of Ka'apor ethnobotonay (1994) and Anderson *et al*'s study on Babassu management in Maranhão (1991). My own study aims to contribute to this body of research.

My aim, within the constraints of the research topics, has been to find out: '*what* have these people done, *how* have they done it, *who* has done it, *what* does it mean to live *where and how* they do?' (Harris 2000: 8). In his anthropology of a Brazilian peasant village in the Amazon, Mark Harris has sought to answer these questions. He has argued for 'the grounding of identities in the materiality of everyday life' citing Pálsson's concepts of 'living discourse' and 'democratic ethnographic dialogue' (Pálsson, 1993). It is in this spirit that I undertook the enquiry as well as the writing.

Finding out

In my own study I have drawn upon more than 15 years of previous experience in the communities and small towns of the Brazilian interior, working for international development NGOs and on international development projects. For this study I chose to share the 'everyday life' of my respondents as much as possible. This was productive as a research strategy, notwithstanding the inescapable restrictions on time imposed by visits to the rural parts of the case study areas that, at most, lasted for 4-5 weeks. This methodology opened up observation and communication about the 'bodily knowledge of practice and skills.' (Harris, 2000: 7). It enabled me, for example, to find out about the role, literally, of taste in the food cultures of rural households and small local markets. Smells and tastes, colours and textures, are relished and recalled just as are words and thoughts. (Sutton, 2001). As is discussed in Chapter 2, understanding that this is so, and sharing in the experience, opens up the subject of enquiry to methods that go beyond the textual, with the spoken word evoking memories of how things were, still are or have ceased to be.

One of the fundamental questions of this study is how the small farmers who might be thought of as 'at the receiving end' of globalisation may - but not necessarily will - through

their strength and creativity either resist or adapt. Their strategies for reproducing a society, a food culture and a body of agricultural knowledge, have changed steadily over time but have built on foundations created by thousands of years of indigenous and later of 'traditional' agriculture - even if this can only be directly known - through people's memories for a few decades at best. The study has sought to examine the small farmers' everyday life worlds, grounded as these are in both past and present, in the spirit of intellectuals committed to making a contribution to political debate and/or furthering the interests of indigenous and other disregarded people.[1]

Apart from my utilisation of Bourdieu's theoretical and empirical work on *habitu*s and *strategizing*, which is referred to in Chapter 2, this study has also followed his example by identifying people's strategies to survive and to adapt. Like Bourdieu, I have tried to enter imaginatively into the subjects' 'worlds' by trying to 'set up a relationship of active and methodical listening' (Bourdieu, 1999b:609).

The social divides in the rural areas as such were not the focus of my research but they were part of the context and provided part of the explanation. These divisions could give rise to dilemmas that I could only resolve by making choices. For example, my dialogue with small farmers might well have provoked suspicion from certain traders and this could help to explain why at no stage in the fieldwork were they willing to co-operate. Getting to know a Catholic priest in one site also might have affected how and even whether I was received by other people, since he had his detractors as well as his admirers. I resolved these dilemmas by prioritising the dialogues with, respectively, the farmers and the priest.

During my career I have been influenced by development professionals such as the British academic and practitioner, Robert Chambers, and was familiar with those practical, grounded methodologies that have been promoted by him and his associates and which are known as 'participatory research' or 'participatory appraisal'. They stress the importance of listening to the voices of the 'poor and marginalised…..in a world of increasing polarisation of power and wealth, [divided] into North and South, into overclasses and underclasses'. (Holland and Blackburn eds., 1998:xv) Many of the methodologies within Chambers' 'toolkit' were useful during the core phases of research. (Chambers, various, especially 1992 and 1994).

[1] This category includes many intellectuals working in NGOs and campaigning organisations such as FASE and ISA in Brazil, GRAIN internationally and ITDG both internationally and in the UK, for example (see Ch. 2). Others in the category comprise Pierre Bourdieu, Andrew Gray (who worked for the International Group for Indigenous Affairs), Darrel Posey and Vandana Shiva, to name but a few.

Chambers' methodologies, useful though they have been for this enquiry, prove insufficient on their own for a research project whether by the 'social' or the 'natural' scientist. The implicit premise of his work, which is that *rapid* research on its own can yield results that eventually will enhance the lives of respondents, is open to question. It stands in marked contrast to the approaches of both Bourdieu and Narotzky. The rapid methods of Chambers and his peers may be useful, so long as research ethics are not forgotten in the process, but they need to be complemented by a rigorous approach to the understanding of society and of the natural world grounded in the sort of cultural and economic theories developed by Narotzky (1997) and her peers as well as by the sort of theoretical and methodological approach developed by Pierre Bourdieu. His focus on the 'simultaneously practical and theoretical problems that emerge from the particular interaction between the investigator and the person being questioned' (Bourdieu, 1999b:607) suggests quite a different relationship between researcher and respondent than that which is proposed by Chambers. This having been said, there is much that is of great practical value in the Chambers methods, even if the methodological terms which he has introduced into the researchers' vocabulary, or jargon, such as 'participative observation', 'transect walks', various types of mapping exercises, triangulation and others, demand careful definition.

Oral History

One of my most important categories of informants was that of older people. These were rural men and women, often people who do not read or write and whose voices are unheard outside their local society. They are usually respected and sometimes are even influential among their own kin and neighbours.

In my interviews with these older informants I prompted them to reconstruct, from memory, something of the detail of the history of the land on which they depended (and still do depend). I asked my informants to tell me about manioc farming methods and trading practices, their memory of manioc varieties in the past and more recently and their memories of *farinha* making, for example, and attitudes to different everyday foods past and present.

The ethnographic dialogue was essential to the unwinding of the stories. I prompted my respondents to talk to me about the ordinary things of life such as their family, their land, their working lives - and then to place their memories of farming and food in general and of manioc in particular within the story. My interview format for tape-recorded sessions was the most tightly structured of all interviews undertaken in the field.

I invariably preceded a recorded interview with an older person by showing the person photographs of the manioc fields and *casas de farinha* of other regions and would briefly run through salient details of the ethnobotanical data already collected in the existing research site or previous site. I would name varieties of manioc about which I already knew, mention some of the characteristics of the varieties which I had observed or been told about, mention some highlights of visits already made to *casas de farinha*, and so on. The recorded interview was frequently part of a longer process of getting to know an older respondent. I could usually return, after the recorded interview, to pursue an especially interesting line of enquiry, check facts or even seek clarification of something learnt from another person. Such interviews were invaluable as a source while still falling far short of being a complete oral historical account of the life of an individual.

Selecting Institutional Partners

The perspectives both of local colleagues and of the farmers and their families proved to be influential in both the refinement and the application of the research strategy. The strength of the research project and its line of argumentation depended very much on three factors: the selection of appropriate Brazilian institutional partners, the establishment of good working relationships, and the careful selection of research sites according to pre-established criteria.

I wanted to work with colleagues who were both aware of the issues - the injustice of poverty and the dramatic dilemmas in which so many farming families find themselves - and who were curious about the causes and effects. Research into the changes in the manioc cycle within the life-memory of rural people brings researchers up against the social divide and the consequences of a very rapid process of modernisation. (see Martine *et al*. eds., 1987:flyleaf) Although not all of them do this, in searching for explanations researchers should take into account the nature of the social divide in Brazil. The divide is not only between the comfortable moneyed classes and those who live in permanent insecurity. It is also between land-owners and those who have no land or no security on the land that they do occupy. It is between rural and urban people, between men and women, between black, white and indigenous, between the north and north-east, (widely perceived as 'backward'), and the much richer industrialised south.

One of the vital ingredients for success was the number and variety of the introductions that I was able to gain and the quality of the relationships that I was able to sustain at community level in each of the case study areas. The most significant institutional partners were the organisations that introduced me into the area. Given that I felt it essential to adopt a

position of engagement with the small farmers with whom I would be working, I set out to identify institutional partners with the following characteristics:

- Good relations and empathy with small farmers, both men and women, their associations and unions (STRs) at grass roots level.
- A commitment to working with farming men and women in a programme or programmes which both respected their dignity and knowledge and contributed to their liberation from inequality and social exclusion.
- An understanding of the character and consequences of inequalities and exclusion within Brazil and globally.
- Those with a professional working relationship with other agencies working in the rural areas whether these were official (local, national or international), NGO, research or others.

Well established NGOs working in rural development or in bilateral rural sustainable development programmes proved to be the best choice due to their experience and philosophy. Usually working in ways that are different from official agencies, they have developed their working relationship with small farmers through programmes that involve regular contact at grass-roots level.

Although I had not expected that one of my important partners might have been a university department, the team of academic and research staff from the department of agriculture at UESB in Vitória da Conquista in SW Bahia engaged strongly with my work. They introduced me to an area where no NGO or development agency was operating and welcomed me, albeit temporarily, into their team. Apart from this, I was offered research associate status at NAEA-UFPA in Belém and was helped enormously by staff at EMBRAPA-CNPMF in Cruz das Almas (BA) and by the senior *Manihot* researcher at EMBRAPA-CENARGEN in Brasília.

Case Studies

The reasons for selecting the case study approach

I selected the case study approach as the most promising way to structure this enquiry. I did this because, in the broadest of terms, the case 'is a specific, a complex, functioning thing.' (Stake, 1995: 2) For 'thing' I would substitute 'society' or 'local society.' The case is bounded quite literally in a geographical sense (the boundaries of the community in some

sense can be identified on a map). Relationships within a particular rural community and neighbouring communities are rich, multiple and complex.[2] And again, albeit with exceptions, the people living in a community tend to communicate with one another rather more - both more intensively and over long time periods - than they do with outsiders. This is particularly significant if part of the theme, as it is in this study, is collective memory and when what is being remembered and communicated about are human practices - the practices, for example, involved in the cultivation of particular varieties of manioc. Such practices are acquired by individuals and then shared and passed on through social interaction within families and communities.

Yet what is being studied is not so specific that each 'case' is unique. There are commonalities as well as differences between communities and between various regions and states. There is a degree of correspondence between case study sites, but also significant differences which can help to understand how and why things are going in a particular direction or to suggest explanations as to why a particular set of practices is being sustained in one place but not in another or how modernisation affects small-scale-manioc farming in different ways. This is why I chose to study not one but four sites, which geographically were far apart, two in Pará and two in Bahia. It is why I drew up criteria for selection that would enable me to identify correspondences as well as differences between the different sites. This might be called 'collective case study.' (Stake, 1995:4).

I wanted to contribute to the broadening of the existing debate about manioc and manioc culture across Brazilian regional and scientific boundaries - between the north and the north-east. For the most part the social scientists whom I met were knowledgeable either about Pará and Amazônia or about Bahia and the north-east while the natural scientists rarely extended their investigations to include human culture and peasant agency.

Despite its advantages, the strategy that I adopted of studying the singularities of four case study sites, amongst all the thousands of other possible contenders, has meant that I cannot present the results as being fully representative of general social, technical or botanical phenomena although they most certainly illuminate some trends. Yet, all the same, in addressing the research questions I was able, through the fieldwork, to analyse the

[2] Deborah Lima (2004) provides this definition of community (*comunidade)* in the Amazon: 'As a result of [the work of MEB, an organisation associated with the progressive wing of the Catholic Church that began work in the Amazon in the 1970s] (a combination of mission and outreach), the term *comunidade* has come to define a politically organised locality whose population identifies itself as members of this organisation'.

complexities of peasant manioc-management strategies in the different areas and to see how these strategies impacted on agrobiodiversity in manioc, about which so little is known.

Criteria for case study site selection

The tables in Appendices 3A-3D suggest contrasting characterisations of two communities in each state. I developed the criteria on the basis of previous personal observation over a period of around ten years and refined them in discussions with colleagues in Brazil before I started the fieldwork. The concepts incorporated in the tables proved to be generally sound and the criteria set out in appendix 3A worked more or less well in the different sites - Gurupá perfectly and Capim very largely. Site selection in Bahia was more difficult but offered other opportunities, one of which related to the variety of food cultures. The most significant opportunity was to do with cultural divergence *within* communities. The changes that I eventually made for the Bahian studies are illustrated in relevant appendices.

I expected that there would be contrasting data between one state and another. Sites would also be selected to illustrate differences between the communities and farming families on the periphery of the modern capitalist economy and those that are more integrated into this economy. I had not expected the significant differences that were to be found *within* micro-regions and *within* some small communities in the relationship of farmer to manioc *or* in the management of the Manioc Chain. As I was to discover, the differences that did exist did not follow the contours of either social class or economic status.

I had hoped to work in *single* small communities in each of the four case study sites, each of which would comprise fewer than one hundred families. Originally I had decided to select communities that I would get to know in some depth during phases two and three. Yet in the end I was able to focus on the culture and practices of a single small community only in Gurupá (PA). For the other three sites, influenced by the views of my local hosts and partners, I opted to work in up to four communities in what could be seen as an area or micro-region. Had this been a quantitative study, this unevenness in the size of the 'sample' areas and communities would have been questionable. The immersion in the everyday life of the more remote and 'traditional' community of Bacá in Gurupá served me well in later fieldwork and provided data which, in its contrasts to practices in the other places, served as a valuable foil to the findings from these other places, as we shall see.

One common factor in the selection of communities and areas for case studies was that in all of them there should be a stable core population and a good percentage of older people as well as of younger and active farmers. This was so that I could trace changes over a period

of time, both in the selection of manioc varieties cultivated and in the Manioc Cycle. I would do so through interviews with the older people and with the more experienced farmers - expert farmers, both men and women - and of any age.

Applying this common factor meant that I ruled out one interesting possibility. There were opportunities in Bahia to work with *assentamentos,* or fairly recent settlements of farmers, who typically were former landless families. When I did visit such a settlement near Inhambupe I found them to be isolated from their kin and community networks and living with few older people, although one family was cultivating a rich diversity of manioc varieties.

Base line studies

Given the inevitable time limitations I was also keen to identify communities in micro regions where there existed some form of substantial base line study, whether this was economic, agricultural or social. Yet it turned out that this was only the case in Gurupá where FASE, one of Brazil's most experienced and well-established NGOs, had been working for many years. Other studies, of variable quality and theme, were available in the other sites, apart from in Quaraçú where I was unable to identify any sort of base line study.

Selecting the case study sites

Before the case study sites could be selected the following decisions were taken:

- Elaboration of the research questions
- Decisions on the ethics of and approach to working with rural people (ways of creating the ethnographic dialogue)
- Finalisation of the research design (including the definition of the scope of the research)
- Definition of criteria for case study site selection (including acceptable degrees of flexibility)
- Selection of institutional partners
- Appraisal of the relative importance of the site as a manioc-producing area. (see table 3-2 below)

The selection of institutional partners was critical. The second most critical decision was the selection of the key initial local contact. Having extensively discussed the research with the institutional partner and established a basis for trust I was largely in their hands with regard

to the initial contacts within the site. The institutional partners and the key initial contacts are set out in table 3-1 and further appraised later in table 3-3.

Table 3.1 – Introductions to the case study sites

Case study site	Introducing organisation	Key initial contact(s)
Gurupá, Pará	FASE (national NGO) with lengthy history of committed work in the area	STR (Rural Workers' Union).
Capim, Pará	PRORENDA (German funded bilateral development project)	Adviser to the Mayor, EMATER (agricultural extension service) and the President and Treasurer of the STR. (Rural Workers' Union).
Cândido Sales, SW Bahia (especially Quaraçú)	Agriculture Department of UESB, the State University of SW Bahia (based in Conquista)	Some local farmers in some of the communities in the municipality.
The *Agreste* of Alagoinhas, Bahia, especially Inhambupe	COOPERA (local NGO), based in Inhambupe.	Key contacts in 5 communities.

It was important for the study that most of the case study sites should be relatively important areas of manioc production. Gurupá is relatively unimportant within the State of Pará. But, as we shall see, despite producing plenty of manioc for local subsistence needs it does not produce sufficient surplus even for the urban market in Gurupá town. However, all three of the other sites were significant producers of manioc. Table 3-2 below is presented to illustrate this point.

Table 3-2 – Manioc production in case study sites, ranking and percentage participation in state.

State	Case study no.	Municipality	Production tons p/a	Ranking	% partici-pation
Pará (141 municipalities	**1**	Gurupá	2,800	120	0.07
	2	Capim	38,400	23	0.94
Bahia (406 municipalities)	**3**	Cândido Sales	180,000	1	4.34
	4	Alagoinhas	21,580	54	0.52
		Inhambupe	24,000	43	0.58
		Crisópolis	112,000	3	2.70

Source: IBGE – Annual Municipal Production 2000

Pará: Gurupá

Although it would have been possible to undertake an interesting study in any one of a number of the more remote areas of Pará, the combination of certain selection criteria and the characteristics of institutional and local partners was best met in Gurupá. The only difference between the reality of Gurupá and the criteria was that the population was traditional, not migrants into their lands.

It was arranged that I should visit during the dry season, between May and November, after the river level had fallen, as it would then be much easier to get around. Both FASE and the STR suggested that I should work in one particular community where there was a wide variety of manioc and where people made plenty of *farinha* for sale to the local market. I ended up staying with the family of a much-respected community leader in Bacá, which has plenty of manioc and delicious *farinha*. A bonus turned out to be that, despite its geographical isolation, Gurupá had been studied by anthropologists, including Charles Wagley from 1942-61, Richard Pace from 1983 onwards, Eduardo Galvão, and Emilio Moran, (Wagley, 1953, Pace, 1998, Galvão, 1955, Moran, 1993). There is at least one other significant study of Gurupá by FASE co-ordinator Paulo de Oliveira (Oliveira Jnr., 1991).

Pará: Capim

For the second case study, the area supplying the metropolitan market (and beyond) with *farinha*, I had hoped to identify an area properly within the Bragantina area of NE Pará, the region with the largest production of manioc in the state since the 1950s. Yet there was no appropriate institutional partner. Furthermore, the rapid modernisation of recent years, along with environmental degradation, made it difficult to identify a site which met the criterion of social stability. In Capim, to which I was introduced by PRORENDA, the STR and local authorities, especially the Agriculture Secretariat, had a reasonable relationship of collaboration. Yet I believe that my decision to 'officially' accept my union friends as my hosts in the region communicated my intended message: that I planned to give priority to work at grass roots level. I had no cause to regret this decision. PRORENDA, local farmers and other organisations had undertaken a 'Rapid Participative Appraisal' of agriculture and the rural economy in 2001. I was based in Capim during this case study.

Bahia: Cândido Sales

I selected the first site, consisting of two of the three districts of the municipality of Cândido Sales, with the support of three agronomists in the Agriculture Department of UESB, the State University of SW Bahia in Vitória da Conquista. They provided technical advice to local farmers, in particular regarding crop husbandry and pest and disease control, and were

conducting some trials with various manioc varieties in the area. My contact with a member of the team, who had conducted fieldwork for his Masters' study in the municipality of Cândido Sales, led to an offer to introduce me to some farmers in local communities and to provide me with logistical support at the University. This municipality was the largest producer of manioc in Bahia in 2000 (see table 3-2). There was also a distinctive feature of the manioc food culture of SW Bahia, quite different from other regions, in that the *biscoito* is a traditional starch-based food and is widely traded in Conquista and scarcely known, or not known at all, in other case study sites. I was based in the small town of Quaraçú during this case study.

Bahia: Agreste de Alagoinhas

I had initially hoped to undertake a case study in the Recôncavo area of Bahia, just to the south of Salvador, the State capital, since this area supplies so much of the capital's *farinha*. However, I was not able to identify a suitable institutional partner in the area. The Alagoinhas area proved to have some characteristics in common with the Recôncavo (food marketed in the capital, especially *beijú*, mixture of agriculture in transition and modernised agriculture, ranking high among manioc producing municipalities in Bahia). Both regions had also been extensively studied by EMBRAPA-CNPMF.[3]

For this, my second Bahian case study site, in the *Agreste* region of Alagoinhas, which is part of the micro region referred to as the *Litoral Norte* (Northern Coast), my institutional partner was to be the well-established local NGO, COOPERA. They are based in the town of Inhambupe, capital of the municipality of the same name. I was based in Inhambupe during my period in the area. COOPERA works in a number of the municipalities in the region, two of which have a significant production of manioc and another, Crisópolis, which is the third largest producer in Bahia. The town of Alagoinhas was the largest of the various municipal capitals in the region and the market was the regional outlet for the *farinha* and starch foods of the majority of local small producers. `

In the past COOPERA had had a special interest in manioc. However, a project that they had initiated for developing local manioc production and manufacturing *farinha* in a cooperatively run factory in Inhambupe had unfortunately failed. Yet as a result of this work, they and some of their partners commissioned a study of the economic and agro-industrial aspects of manioc in Bahia. (Torres Filho, 2002) This well-researched, provocative study received no local launch and, as far as I was aware, its findings and

[3] EMBRAPA-CNPMF is located in Cruz das Almas in the Recôncavo.

recommendations were not the subject of any debate while I was in the area although the book did become available while I was there. COOPERA staff were therefore well informed about manioc production and processing in the area yet they had begun to work in other types of rural programmes before my arrival.

PART 2 – FINDING OUT - THE PROCESS OF ENQUIRY

Wherever possible I selected my principal respondents in the rural areas from among the lesser privileged as well as their representatives and/or advocates. In this way I remained true to my aim to research the topic from the farmers' perspective as much as possible. Thus, in a gathering of rural people and extension agents or other urban-based people I would make a point of spending informal time, such as during refreshment breaks, with the rural people, especially with women or others who might be disregarded in more formal discussions. I might be introduced, perhaps by an urban-based outsider, to a rural family or to people in a field or in a *casa de farinha*. It was in the sites that I visited during the fieldwork that I met most of my respondents. These were the places where I was able to pose a number of highly specific questions. I could only hope to find the answers amongst the small farmers and the local processors of the crop.

As with any decision regarding research strategy, there were unexpected consequences. In most places where I worked the rapport with farming families was relaxed and easy. However, given the fact that there were social tensions, this sometimes made it more difficult for me to gain access to officials from among the local elite. The unexpected but perhaps unsurprising result of my decision to prioritise rapport with farmers was that local traders were frequently uncooperative and were unwilling to be interviewed. Their world remained well nigh closed to me. Any researcher who wished to investigate how trading is organised would, I suggest, need to obtain introductions to them through other members of the small business, entrepreneurial classes.

Power and Mobility

The connections between different domains (rural, urban and beyond) within each site were significant to the research enquiry. It was usual for people in the local town, the seat of a municipality, to have connections in the state capital and sometimes beyond. Yet it was uncommon for rural people to have connections much beyond the local town. As the researcher I was therefore associated with a local urban elite who had connections beyond the local town and rural areas and who could move back and forwards at will, in my own case from my country to Brazil's metropolitan cities on to local towns and deep into the rural

areas. In this respect I had much in common with NGO project staff, agricultural and other research scientists and many metropolitan Brazilians.

Local government

Access to the institutions of local government, agricultural extension, church, school teachers and others at urban level was relatively easy in the two Pará sites, where my institutional partners had a good working and political relationship with the local government, and access was sufficient in Bahia. Nevertheless, in each case study area I sought to conduct structured interviews and sometimes to repeat semi-structured interviews at least with the municipal Secretary of Agriculture and the Secretary of Economic Development (or equivalent), municipal agricultural extension agents (EBDA in Bahia and EMATER in Pará), the local Catholic priest, school teachers and health workers, officials and members of the rural workers' union (STR) and/or agricultural association. For a variety of reasons, interviews did not take place with all these officials in every site nor were the interviews useful in all the sites.

Despite my requests, local government officials rarely were able to provide very much economic or other background data about the municipality or about agriculture in particular, although most were as helpful as they possibly could be. This lack of data was most probably due to lack of resources to record and manage such information. However, I had hoped to obtain good local maps indicating the location of communities and rural roads, for example, from local authorities. Although this proved difficult it was not impossible. However, the quality and coverage of maps obtained varied from site to site. In most cases I invited local authorities (as well as rural people) to complement my maps so as to give greater local detail. Although the Information Office of the State Government of Bahia in Salvador has a good archive of maps for the state, there is no such institution in Pará. Even so, I was able to access an up-to-date map of all of Pará that provided information about legalisation of land occupation from IBAMA, the Federal Environmental Agency. I was able to obtain basic local maps in Pará from both NGO and local government sources.

The Catholic and other churches, teachers and health workers

I chose to contact Catholic priests rather than pastors of other religions. This was for two reasons. First, in all places the Catholic Church had been present in the area at least for several decades and was engaged in various types of development and child-focused relief programmes. Secondly, the Protestant churches in the case study areas tended to be interested only in evangelisation. Individuals and families from Catholic and Evangelical communities were among my key informants in Capim and Quaraçú but members of different congregations belonged to different social and kinship circles in the municipalities.

It was in Quaraçú that I received an 'early warning' that, even among Catholics, there were divergent views about the local priest, possibly for party-political reasons. This priest proved to be one of my key informants, and it is possible that my connections with him meant that in one small community access and dialogue were more limited than I had hoped would be the case. I recognised this as a consequence of my decision to value my connections with this priest. Secondary school teachers and local health workers in most sites were also important sources of local information and were not controversial as were ministers of the church.

Arriving in the municipality and small towns

There were two distinct types of location in which the manner of my arrival was significant: the local small town which was to be my base and the rural communities in which I would conduct my first hand research into people, change and the Manioc Chain. Table 3.3 below demonstrates which type of institution introduced me in my four case study sites and how the introduction affected my access.

Table 3.3 – Ease of access to local institutions and families

Town/ Case study	Type of introduction	Ease of access at:	
		Urban level	Rural level
Gurupá	NGO	Excellent	Excellent
Capim	Rural Workers' Union (STR)	Good	Excellent
Quaraçú	University	Poor (i)	Moderate
Inhambupe	NGO	Poor (ii)	Excellent

Note:
(i) In this case, the University had no connections in the municipal capital and few in Quaraçú where I was based. Their contacts, which were still very useful, were with farmers in a number of small rural communities.
(ii) In the case of this site, the ease of urban access was poor because of political differences between the NGO and an important sector of the urban elite.

Arriving in the communities

My first objective was to learn about changes in the manioc chain in the following areas:

- production of the crop and production of foods
- distribution
- exchange
- consumption of both the crop and the foods derived from it

My second objective was to document the diverse varieties of manioc in the area.

One of the well-established and understood methods of social investigation of PRA/RRA[4] is the 'transect walk'. This is where the researcher walks, or otherwise travels, with local people through a place or places and, as s/he moves through the geographical space, s/he observes and invites respondents to talk about the place, what happens there and other relevant aspects. The physical environment evokes all manner of topics of conversation that are of use to the research enquiry and that frequently can lead people to comment on unexpected topics.

Although an essential part of my methodology of enquiry involved visiting fields, *casas de farinha* and other places where other foods were made, as well as homes and their back yards, I had not anticipated the central importance of the interviews and discussions which took place physically in these locations. The quality of data and ethnographic information gleaned on these visits far surmounted that acquired in other environments.

In every case, when I arrived in a community, I was the guest of one individual farmer and family about whom I had previously been briefed. In some cases I stayed with the family for a few days. In other cases I made a day visit. In one site I spent three weeks with one family.

The format of my first visit was similar to what happened in all subsequent visits. In each case I allowed time to tell the family about myself and my work, showing photos of my family, my home city and my country. I then always asked to see the back yard and the kitchen area. I was invariably shown around the back yard by the woman of the house - and this visit was inevitably very informative. I always asked her to name the trees and plants and, of course, the manioc varieties and I asked her to describe the uses of all these plants. In this way I hoped that my hostess and host would begin to see me as someone who was curious about the minutiae of their plant capital. This was to prove useful later in the manioc fields. In some back yards there were a few varieties of sweet manioc and occasionally some wild varieties. The visit to the back yard usually lead on to the kitchen or cooking area and, depending on the locations, to the oven used for *biscoitos* and/or *beijú.* These first visits helped me to situate the family within the social hierarchy of the community. For example, in all the sites the better-off families had either more space and/or more equipment. There might be a larger back yard and a gas cooker as well as a traditional wood-burning fire or hob and oven. Better-off families would also have more cooking pots. Alternative material

[4] PRA – Participative Rural Appraisal. RRA – Rapid Rural Appraisal.

indicators were also used to undertake a social ranking of families such as degree of literacy, size and style of house and number of boats (in Pará). In each case this early part of a visit also gave me a sense of the extent of traditional knowledge of the particular farming family.

Interviews and the creation of dialogue

My method of investigation during the scoping phase of the fieldwork, before I began the 'grass-roots' fieldwork of phases 2 and 3, mainly consisted of single or multiple semi-structured interviews with individuals and groups of individuals from a range of institutions. In most cases first interviews were followed up by further study of materials either provided by, or recommended by, my respondents. In those cases where I had anticipated the possibility of working with individuals and/or their institutions the element of dialogue in the encounters was important, especially when I first went to the case study site. I would also ask to be introduced to any older people who could tell me about farming in the past and to male and female expert manioc farmers. In the two sites in Pará I was invited to explain my work and, on a number of occasions, to answer questions. This was a good way to make myself known and to publicly explain my independence from any state or federal government programme and, where appropriate, to associate myself with my host institution.

In SW Bahia, where levels of social organisation are low, very few people turned up to a single meeting about my research. Those who did come along were all women, most of whom I had actively encouraged to come. They were more open than were the men to meeting with an outside female researcher, and this despite the absence of social organisation in the small town or village.

In each micro-area and in each community where I worked I undertook social mapping exercises so that I could better select key informants and always ensure a good gender balance. I knew that members of one kinship, social or interest group might not offer any information about the lives and practices of those in another group. The practice and memory of a male farmer complements that of a woman and vice versa. Social mapping enables the researcher to identify who's who and what type of social organisation exists between and among kinship groups, religious organisations, political organisations, women's groups, local interest groups such as those of traders, shop-keepers, farmers' associations and rural workers' unions. The process also includes the identification of schools and health posts in an area and the location of traders' depots and rural industries, for example. Social mapping, which includes an element of physical mapping, helps the researcher to distinguish between those with greater wealth and property, including land and power in a community, and those with little or no wealth.

Once the process of social mapping was well under way, I was able to begin to select key informants from the following categories of people, always bearing in mind the importance of ensuring a good gender and generational balance:

- manioc farmers considered the most knowledgeable by others in the community, the 'expert' farmers
- those who worked in the making of *farinha,* including domestic *farinha*-makers, and owners of or managers of larger *casas de farinha*
- those who made other foods from manioc, either for their own consumption and/or for the market
- both the larger landowners and labourers with little or no land
- other authoritative, well networked persons such as teachers, nurses, health agents, volunteers with the Catholic mission for children (*Pastoral da Criança*)
- older people with a good memory and who like to talk
- the president and officers of the agricultural association, rural workers' union (STR) and/or any community council where these existed.

(a) In the roça

The four main purposes for visiting manioc fields (*roças)* were:

1. To identify, describe and discuss varieties and the management of varietal diversity.
2. To get to know individual farmers, their perceptions of aspects of the manioc chain, their motivations for taking the decisions and adopting the farming strategies that they did, their successes and failures, felt pressures, changes in their lives, issues regarding land tenure and occupation.
3. To learn about techniques of farming, for example:
    - methods, rationale and timing of planting
    - decision-making regarding selection of planting material
    - cultivation practices
    - who works in the fields and when they are paid, at what rates
    - decision-making regarding the harvesting
    - methods of harvesting
    - transportation of the crop to the market or place of processing
    - ecology, soils, pests and diseases
4. To research the words used by farmers to name parts of plants, farm implements and actions relating to farming. Classification and the naming of things and actions,

interesting in itself, can also give clues as to the history and origins of farming practice discussed by Balée and Moore, 1994).

The conversations and observations on the journey to the *roça* and the semi-structured interviewing and plant identification which took place in the *roça* were among the most significant within the social and ethnobotanical enquiry. The farmers were completely at ease and self-confident under these circumstances.

(b) Using helpers in the roça

Assistants in the field were of great practical value. They helped, for example, to measure petioles, count lobules and describe colours. Sometimes they helped with recording data and discussing findings at the end of a visit. Being local people, they would take me around a community where my farmer-respondents were not free to do so because they were working elsewhere and the assistants were able to introduce me to farmers and explain, in their own words, the objective of our visit. I always made a point of taking time to explain to my assistants as clearly as I could the purpose of my work and the tasks that I hoped to undertake in any one visit.

In the ideal field (*roça)* visit, I would go with one or more local 'assistants' who would need to have basic literacy and numeracy skills. However, the circumstances of visits varied enormously from site to site and from community to community. So it was not uncommon for me to visit a field with just one or two farmers and no external assistants. On several occasions, and in all locations, my urban partners had strongly advised me against recruiting paid assistants. The reason for this advice was that a volunteer assistant would be more likely to feed back into their family and community whatever they learnt with the researcher during the course of their work. My experience with volunteer assistants was positive and my one experience with a paid helper was frustrating and short-lived, although the person was a good companion.

(c) In the casa de farinha

Casas de farinha play a pivotal role in Brazilian rural society in all the areas where I worked. Their role as centres of rural production and social reproduction is discussed in chapter 7. The issues that I explored with my informants included the nature of work, changes in work, technology and technological change from the simplest manioc scraper to the most sophisticated electrically powered toasting griddle, the naming of things and actions, techniques for manufacturing different types of *farinha*, perceptions and preferences of *farinha* types, the market, home consumption of manioc and manioc-based foods and the

relative values and characteristics of different varieties of manioc. Interviews conducted in the *casa de farinha* also provided me with important insights about the characteristics and uses of different varieties of manioc.

All my urban informants, regardless of occupation, gender or generation, were convinced that the *casa de farinha* has not essentially changed since the time the Portuguese first arrived in Brazil and began to document social life. I was therefore little prepared to know how most effectively to record and what most pertinently to document in the enormous range of different kinds of establishment that I visited. I began by taking an active interest not only in the ways in which *farinha*-making technologies had changed within the living memory of my informants, but also the way in which the technologies reflected the creativity of the farmer-*farinha*-maker and the *farinha*-worker.

I visited around one hundred *casas de farinha* during the period of my fieldwork. In those where there was less pressure to work fast and supply large amounts of *farinha* to the market, as in Gurupá and some *casas de farinha* in Capim and the Alagoinhas area, I was permitted to take part in some of the activities involved in the production chain.

Wherever possible, on visiting a *casa de farinha*, I would show photographs of other types of establishment and observe people's reactions to different technologies, different implements and containers, different ways of managing toxic waste (*manipuera* or *água de mandioca*). As it happened, it was useful that in my first field site, in Amazônia, the technologies had been the closest to those employed by many indigenous peoples of all four sites. As I described the *casas de farinha* in Gurupá and in some places in Capim and showed photos, I provoked the memories of some of the older people in Bahia of technologies and practices no longer in use in their area.

Work with school students in Gurupá

One valuable experience in Gurupá, which unfortunately could not be repeated elsewhere, was with school students whose teachers invited me to talk to them. I told them something that they may not have known of the culture and economics of manioc and the value of agrobiodiversity of the crop. This led on to a simple research project in which the students agreed to gather as much information about different varieties of manioc as they could in a two week period. Together we compiled a list with basic descriptions (colour, classification (sweet, bitter or *maniçoba*) and usage) which was then written out on posters in the classroom. I had intended to encourage the students to value their main crop and to appreciate the knowledge of their elders which was denied among young people in the local

town and ignored by many 'professionals' who happened to visit. As it happened, and despite instances where the information proved to be incorrect, the students' findings and the ensuing discussion provided me with a valuable source of information about varieties of manioc which occasionally confirmed other findings and sometimes provided me with ideas for additional lines of enquiry with farmers in the fields and homes in this area. Following this research project with school students, I was invited to sit in on a formal, structured interview between an adult woman student and one of the most knowledgeable of the local expert manioc farmers. The interview and subsequent conversation proved to be of particular ethnographic value, especially for perceptions of manioc farming. The interview had been arranged as a follow-up activity to the students' manioc work and later various short articles were posted on the school's mural newspaper.

As so often in Gurupá, the research experience was rich due both to the value placed by the local authorities as well as local civil society on learning and education and to the degree of social organisation in the region. It is very probable that this was in part due to the fact that a serious experienced federal NGO had been working for several years in community development programmes in the municipality.

Work with rural agricultural students in Gurupá and Inhambupe

In two of the four case study sites there was a rural agricultural school (*Casa Familiar Rural* and *Escola Agricola* respectively). These schools are part of a national network that was established to provide appropriate secondary education for the sons and daughters of farming families. In both cases I was invited to talk to the students about my work. I hoped to learn from them about manioc varieties, food culture and perceptions of their main subsistence crop. Each visit was valuable but in Gurupá it turned out to be a quite exceptional learning experience for me. Discussion with the students and staff revealed information about manioc varieties, which was valuable and accurate, and about people's perceptions, for example, of the place of transport and markets within this large municipality consisting as it did of hundreds of small islands in the estuary of the Amazon. The surrounding communities had selected the young people attending this school as being the most promising community leaders and farmers of the future. Yet, although most of them knew about manioc they had received no formal instruction about its cultivation. The school's small library boasted not a single leaflet or book about manioc and manioc farming was not even included in the curriculum.

Morphological and Ethnobotanical description

The objective of this very specific type of research was to list as many local varieties as were known in each area and to collect as much information as possible about each variety. I was

interested to understand both how farmers selected, reproduced, managed and used each variety both now and in the past. I also sought to understand the relative economic and cultural importance of different varieties to farmers. (See appendices 1A-1D discussed in chapter 4).

I undertook a more in-depth study of a sample of varieties as they were growing in the *roças*. This was in order to gain a more in-depth understanding of the morphological differences between varieties. The work also enabled me to learn from farmers much more detail about the origins and the economic value of different varieties. In each case study location, my sample consisted of bitter and sweet varieties, some new and some older varieties and some widely grown and other less widely grown varieties. In some cases I also studied varieties which farmers had not named. Only mature plants already over one metre in height and/or 6 months old were selected for this purpose.

The methods that are used by ethnobotanists and classical botanists , and by economic botanists who engage with folk taxonomy, vary quite widely according to the objective of the study. Although there is broad agreement among botanists, at least in respect of the rationale and conventions used for classifying plants (Jeffrey, 1982, Judd, W.S. *et al,* 1999), a number of different methodologies are used by ethnobotanists, depending on the objective of their study.

There have been a number of studies that were relevant in devising a methodology for use in my fieldwork (Elias *et al*, 2000, Carneiro, 1983, Boster, 1985, Chernela, 1986 and Pinton and Emperaire, 2001). In the end, I adopted the detailed list of descriptors employed by Emperaire and her colleagues used in the project 'The management of biological resources in Amazônia: manioc diversity and its integration into production systems' that she provided for me. I adapted and simplified this schema for greater ease of use in the *roça* and augmented the formula to included some agricultural, economic and historical information about varieties, drawing also on work by Nazarea on memory-banking and biodiversity in the sweet potato (*Ipomoea batatas)* (Nazarea, 1998). EMBRAPA's practical, illustrated booklet (Fukuda and Guevara, 1998), which presents the morphological and agronomic descriptors for the characterisation of manioc in a straightforward format, was readily understandable to farmers and to my local assistants. The table in Appendix 10 sets out the descriptors adopted to use for my work in the *roça*.

In this study, I have presented and analysed ethnobotanical data but, in the end, decided not to present the more detailed morphological data at this time as it does not substantially add to the discussion of the study. This analysis could be the subject of future work.

CHAPTER 4

DIFFERENT WORLDS:
CLASSIFICATION AND NAMING

CHAPTER 4

DIFFERENT WORLDS: CLASSIFICATION AND NAMING

> Among the people known as river-dwellers in Amazônia we find a reference in the language, in images of the forest, of streams and lakes which define the places and times of their lives in relation to the concepts that they have constructed about nature. Their relationship with water stands out as an important element in the framework of their perceptions. The classificatory systems of these populations prove the cultural heritage.
>
> Meanwhile, the dominant reasoning in our class society has historically negated this accumulated practical know-how about the complexity of ecosystems and ways of working on it. We are talking about two systems where the technical-economical works according to different rules and which gives different results and differently affects the environment. (Castro, 1997:226-227 - my translation)

INTRODUCTION

This chapter explores the internal logic of the principal systems whereby manioc is classified and named. By internal logic, I mean that social agents have developed their own coherent and culturally specific practices and rules. (see discussion in Chapter 2, Part 2 and Worsley, 1997: 90 *et seq.*) However one may try and compare them, the systems provide meanings that are distinctive for the disparate groups of people who have created them and who use them. In line with Edna Castro's remarks in the opening citation, I am referring to two different systems of knowledge and substantially different systems of resource management which, as she says, differently affect the environment. I would also argue that they differently affect the prospects of conserving a wide genetic diversity in manioc *in situ* - in other words, in the *roças* of family farmers and others.

By exploring the different logics that are at play in the way people *know* manioc, we are starting to explore two issues: what is truly distinctive about the farmers' knowledge-based agri-cultural practices, and how the management of a high degree of agrobiodiversity in manioc is part of the culture and history of tropical regions of Brazil. This lays a foundation for a richer view of the genetic diversity of the species, which from day to day is sustained by the farmers as they effectively and adaptively manage the Manioc Chain. By doing this, I hope to demonstrate that this diversity should be more actively valued.

There are theoretical references to the themes of this chapter, which are discussed in Part 2 of chapter 2. Classification systems are no exception to the principle that knowledge is linked to power. The methods that people use to classify are indicative not only of the plants or other things that they classify but also of them as well: the classifier is classified by the act

of classification. The inter-generational, practice-based and orally communicated system of the small farmers, reproduced in the multiple places where the food crop is grown, stands in marked contrast with the university-based system of the agricultural scientists.

There is also a practice-based point in the names and terms that are used. The botanists have clear methods for identifying plants. The fact that the agronomists are university-trained does not mean that they do not have very practical concerns. Their classification systems are geared to their imperatives of doing their best, largely through their work with the farmers, to secure the production of high-yield varieties and to protect the crop against pests and diseases. Yet it is the farmers with whose knowledge-systems we are most concerned. True, the ways in which they classify manioc do converge at some points and differ at others with the methods of the agronomists. In other word, there is a good deal of common ground. However, it is the farmers and not the agronomists who have detailed knowledge *at the level at which individual varieties can be distinguished*. It is the farmers who actually name the varieties. It is the farmers who cultivate these varieties which, taken locality by locality, constitute an immense diversity. It is this richness and variety that is in danger of being lost. It is not any formal conservation system but the knowledge-based practices of the farmers, *including* their ways of classifying and naming, which assures the continuance of this genetic diversity.

I begin in Part 1 of this chapter by considering the motives and purposes of the different agents in following their different classification systems for manioc (summarised in table 4-1). Part 2 of the chapter moves on to analyse the classification and naming practices, first of the botanists and then of the agronomists working with manioc in Brazil. Part 2 culminates in the analysis of some of the results of my primary research in the four case study areas, by analysing the manner in which family farmers classify and name the many varieties of manioc that they manage. The tables set out in appendices 9A to 9D reveal the manner in which the 214 names of manioc varieties from the four case study sites are named. This material informs the analysis in this and subsequent sections of the chapter.

In Part 3 I analyse the different types of names that farmers give to manioc plants and show how the categories compare between the four case study sites. In this section, I examine some elements of cultural history in these farming societies and begin to discern the link in space and time between the present and past generations. It is this inter-generational link that partly explains why there is such a rich genetic diversity in manioc. These findings and analysis, which owe much to the work of William Balée and Denny Moore, represent a first

step towards an ethnobotanical study of manioc in the four areas. There is still much work to be done.

PART 1

PURPOSES OF THE DIFFERENT CLASSIFICATION SYSTEMS

Botanists, ethnobotanists, agronomists and family farmers are differently motivated in the ways in which they go about classifying and naming different manioc varieties. This difference is summarised in Table 4 -1. Industrialists also have their different interests but they fall outside the scope of this study. Botanists and agronomists alike are members of a dominant culture that conforms to the dominant capitalist logic of the modern world whereas the small farmers do not so conform. However, as we shall see, the ethnobotanists stand somewhat apart.

Botanists

For botanists, *Manihot esculenta* Crantz is a single botanical species. Specialist botanists and plant taxonomists, when classifying the genus *Manihot*, do this so as to categories plants systematically, to understand plant evolution and to identify new sub-species. Botanists are also interested in researching the genetic and chemical make-up of plants. But for most of them the various *uses* of the cultivated plant are only of marginal interest. The botanists' science is learnt by and valued by agronomists who use the findings of this science to assist them in their crop improvement programmes. Today, with the increasing interest and belief in the efficacy of programmes of genetic modification of manioc to address issues of economic development, agronomists and botanists are collaborating more than ever before in research and development programmes. (Masona *et al.*, 2001)

Ethnobotanists

The ethnobotanist, in common with the historical ecologist, has a very different motivation for studying classification systems. The task of ethnobotanists and historical ecologists is centred on the cultural practices, usually of traditional societies, and is located historically. They

> '…seek a synthetic understanding of human/environmental interactions within specific societal, biological and regional contexts. In other words, the focus of historical ecology is a relationship, not an organism, species, society - not a "thing". ' (Balée, 1994a:1).

On entering the realm of indigenous forest dwellers (the subject of Balée's study) or the world of small farmers in Amazônia and north-east Brazil (the subject of this study), I try to keep in focus the inseparable nature of the relationship between the farmer and the natural

environment. The ethnobotanist is motivated by the drive to understand the complexity and diversity of local knowledge, the complexity and diversity of nature and 'the interpenetration of culture and the environment rather than …the adaptation of human beings to the environment.' (Balée, 1994a:1) It is this perspective that informs the analysis that I undertake in this chapter.

Agronomists

Agronomists are focused on the behaviour of a crop as it is growing in the fields. Their main motivation for classifying the specimens (varieties) of *M. esculenta* Crantz in their gene banks and collections is to select and to be able to cross breed varieties which will improve either the quantity or the quality, for example, by producing higher yields or by increasing resistance to certain prevalent pests and diseases. Their world is mainly defined by the interests of the public or private institutions that fund their work. Many agronomists believe in the modernisation of agriculture and devote their practical skills, experience and insights to this end. Despite the impetus towards modernisation, with so many small farmers cultivating manioc, many Brazilian agronomists who specialise in the crop are genuinely concerned to work *for* them. Some agronomists go further and actually work *with* them - but the few who draw lessons from the enormous knowledge-base and know-how of small farmers are exceptional within the profession. This is partly because they are motivated by different interests and pressures. It is also partly because the motivations of the small farmers are unfamiliar to most agronomists. Thus there are few common points of reference.

In contrast with other similar institutions, EMBRAPA-CNPMF in Bahia does strive to find common points of reference. EMBRAPA brings together under a single roof a number of professionals who jointly are interested in every aspect of the Manioc Chain from planting the crop and production of food through to marketing and social, economic and gender aspects of this whole process. This extraordinary institution is an exception to the rule. It is also struggling to work with two contradictory agendas. On the one hand, it strives to be relevant to the needs of small farmers and to develop a vision of the place of family farming in the capitalist rural economy of the future. And on the other hand, it works with manioc starch and *farinha* industries in the south of Brazil. There is no such institution working anywhere else in Brazil.

Family farmers

The family farmers exist in a third realm that is discussed in some detail later in this chapter. There is very little coincidence between this world and that of the agronomists. Their motivation for organising their plant knowledge is to ensure the safeguarding of their food resources. They must ensure that there is sufficient food and sufficient income for their

perceived needs. The farmers are also curious and experimental, as we shall see in Chapter 6. So they bring new specimens into their *roças* and wait until they have proved to be interesting before giving them a name.

The various interests of these professions are summarised below in Table 4 -1.

Table 4-1: Fields and interests in classification of *M. esculenta* Crantz

Social agent	Motivation	Purpose of classification system	Observations	Refs.
Botanists	• Categorising plants (taxonomy) • Understanding evolution • Identification of new species • Researching genetic and chemical makeup	• Mainly classification from species level upwards. • Genetic research • Input into crop improvement programmes. (including GM programmes)	• Historical perspective • Invaluable naming and communications conventions • relate only incidentally to family farmers	• Rogers and Appan (1973) Rogers and Fleming (1973) Allem (various) • Jeffrey, (1982)
Agrono-mists	• Increase yields • Select for disease & pest resistant varieties • Crop improvement • Economic development for industrial and small farmers	• Classification within the species (i.e. cultivars/ varieties) • Organise knowledge about characteristics of varieties.	• Classification. conventions flexible with some international co-ordination. • Some tensions between variable econ. dev. goals • Relate to family farmers re. crop improvement & high yield varieties	• Conceição 1981, Albuquerque 1969 • EMBRAPA, CIAT etc.
Family Farmers	• Sufficient food for humans and animals • Sufficient income • Curiosity and interest in experimentation	• Classification at species and cultivar levels • Labelling/ naming varieties once they become acceptable for whatever reason	• Some variations in classification at species level between bitter & sweet varieties • Classification at cultivar level peculiar to extended family or community • Imaginative naming strategies. • Ways of naming and classifying manioc teach of the culture & history of communities	• My field work • Numerous indigenous ethnographies • See Chapter 2

PART 2

THE BOTANISTS: BOTANICAL CLASSIFICATION AND THE NAMING OF CASSAVA (MANIHOT)

It is the task of taxonomic botanists to classify and name plants with as much precision as possible according to agreed international criteria. The official starting point of current botanical nomenclature today is taken as being Carolus Linnaeus' *Species Plantarum (*1753), a system which has evolved so that taxonomists now adopt a variety of different approaches to their work of classification. The aim is to make scientific names unambiguous and universal yet botanists recognise that taxonomy is not an exact science:

> 'Our state of knowledge is such, [therefore,] that although theoretically species are precisely definable, in practice, in the vast majority of cases, they are still a matter of the taxonomist's opinion.' (Jeffrey, 1982)

However, there are two international codes that govern the scientific naming of plants: the International Code of Botanical Nomenclature (ICBN) governs 'the formation and usage of all scientific names except those of cultivars'. Cultivars in turn are governed by the International Code of Nomenclature for Cultivated Plants (ICNCP) (Jeffrey *op.cit*.). The scientific names of plants, with the exception of cultivars (or varieties), are given in Latin, which is the universal language of the botanist. Botanists do recognise that common names are very different from the scientific ones. Common names are included but tend to be outside the realm of the botanist, are usually quite ambiguous and are never universal.

The main elements of taxonomic hierarchy are set out in table 4-2 for those who are not familiar with this type of classification system. The table illustrates the manner in which the taxonomist thinks - the framework for any specific taxonomic philosophy. This manner of classification distinguishes the practice of botanists from that of agents within other fields.

From David Rogers and his colleagues to Antônio Costa Allem (2002a), researchers have searched in the great botanical collections in the herbaria and in the literature of travellers and scholars, as well as through their own fieldwork, to develop a way of classifying the elusive and extremely variable genus, *Manihot* (Euphorbiaceae). Rogers explained his and his colleagues' motivation: 'Once the species are properly classified, one has a better opportunity to proceed with more precise studies of the evolution of the cultigen' (Rogers & Appan (1973:1)- the cultigen being *M. esculenta* Crantz.

Table 4-2: The botanical classification *Manihot as an illustration* of the botanical classification of plants

Taxonomic category	Corresponding taxonomic groups (taxa)	
	Form of name	**Example**
Familia (family)	plural adjective used as noun	Euphorbiacae
Genus (genus)	singular noun always written with capital initial letter	*Manihot*
Species (sp.)(species)	1. specific name = generic name + specific epithet 2. specific epithet can be: (i) an adjective, eg. *esculenta (*edible) (ii) the name of the person who has named the plant eg. Crantz.	*Manihot esculenta* Crantz
Subspecies (ssp.) subspecies	Specific name + specific epithet	*Manihot esculenta* Crantz ssp. *esculenta*[1]
Cultivar (cv.) cultivar	Name, sometimes Latin, written in single inverted commas: 'cultivar' is the correct term for the cultivated variants that are usually called 'varieties' or 'landraces'.	Can be used with generic, specific or common names, e.g. *Curcurbita maxima* 'Golden Delicious' or pumpkin 'Golden Delicious; *Daucus* 'Early Nantes', or carrot, 'Early Nantes'. Cultivars of manioc are not commonly named in this way.

Adapted from Jeffrey (1982:52-55)

Rogers and Appan described 98 species in their seminal monograph, the latest that has been published about this species, and which is therefore still the basic reference for botanists. They divide the species into two, the rough-rooted division and the smooth-rooted division. Each of the divisions is divided into two further sub-groups: those varieties with obvate lobed leaves and those with linear lobed leaves. A total of 19 groups of varieties are then described, each of which is sorted into one of the above four categories.

Starved of funds, yet encouraged by the advent of the computer that had recently become available to scientists for non-military research, Rogers and Appan told more about this genus than had any previous researcher. *Manihot*, as with any plant genus, is a closed gene pool. This means that species within the genus are able to cross-hybridize. So, for example, *M. esculenta* Crantz can and does cross with wild species within the genus described in their monograph. But species within one genus cannot cross with species in another genus.

[1] Until Allem (2002), sub-species of *M. esculenta* Crantz had not been identified. For details see table 4-3 below.

David Rogers had been working since 1952 with *Manihot*. In this monograph about the genus (Rogers & Appan, 1973) and in a later one describing the species *M esculenta* Crantz (Rogers & Fleming, 1973), Rogers and his colleagues reviewed all known references to *Manihot* up to the time of writing. They also unscrambled numerous confusions. Amongst these was that relating to the separate classification of 'bitter' manioc (at one time known as *Manihot utilissima* Pohl) and 'sweet' *Manihot* (once known as *Manihot dulcis* (J.F. Gmel.) Pax (or *M. aipi* Pohl) (Rogers & Fleming (1973:7-8). As Rogers and Fleming stated:

> 'The CN^- concentrations[2] are present in a continuum from low to high and are not correlated with any other known feature, whether morphological, ecological, or otherwise and in some known instances they vary with the maturity of the plant. Although from a *taxonomic* point of view a separation is not justified, from both the *economic* and the *health* standpoint, a separation is important.' (*op cit:*8)

Today, botanists fully accept that this binary classification is unsatisfactory for their purposes yet, as we shall see when discussing classificatory systems of family farmers, the binary division remains in use for well defined reasons. The fact that it is widely believed that there are two broad categories of manioc is discussed by Sauer (1963) and later, from an anthropological and linguistic perspective, in a challenging paper by Margaret Nye (1991).

Significantly for the ethnobotanist who is interested primarily in the types of *Manihot* that people use to eat or drink, Allem (*op. cit*.) re-groups M. *esculenta* Crantz into 3 subspecies. In so doing, he clearly recognises that *M. flabefolia* and *M. peruviana* are edible. Allem now recognises that these two maniocs, hitherto classified as species, are actually subspecies of the edible species, *M. esculenta* Crantz. Allem's table (table 4-3) clarifies this re-grouping:

Table 4-3: The subspecies of cassava

Basionym	Novel status	Category
M. esculenta Crantz	*M. esculenta* Crantz ssp. *Esculenta*	Cultivated stock
M. flabellifolia Pohl	*M. esculenta* Crantz ssp. *flabellifolia* (Pohl) Cifferi	Wild Strain
M. peruviana Mueller	*M. esculenta* Crantz ssp. *peruviana* (Mueller) Allem	Wild strain

Allem 2002a:4

THE AGRONOMISTS: CLASSIFICATION AND NAMING OF MANIOC

The agronomist's realm and motivation

Agronomists may either be research scientists or - which is more usual - be practical, hands-on professionals working directly with farmers on a regular basis. They may be involved in

[2] CN^- - cyanogenic glycoside. Rogers & Fleming explain: 'Since the identity of the sugar in *M. esculenta* is unknown to us, we will hereafter refer to the compound by the symbol CN^-'.

extension services of some kind and they usually have an institutional base. Regardless of the level of formal education that he or she has received, the practically-oriented agronomist is a practitioner of a science and an art that is designed to manipulate nature for the benefit of man. The agronomists with whom I have worked in Brazil are interested in family scale farming, and sometimes in much larger scale farming. Essentially they are interested in crops growing in fields. Those who have informed and shaped my view themselves engage in teaching, advising farmers and experimenting in fields and laboratories. They run programmes within the public sector extension services or NGOs. Because they question the natural and economic environment in which they work, it has been amongst them that I have found some of my most engaged informants and discussants both during and after the fieldwork for this research.

When discussing classification and naming of manioc, agronomists tend to take over where the botanists stop. Botanical concepts, including taxonomic concepts, are a part of the agronomists' formation - but only one part. Those who manage gene banks and *ex situ* collections of manioc in Brazil are agronomists who are fascinated by varietal diversity. In common with collectors of any living thing - whether roses or butterflies - these professionals are absorbed in the classification of the genetic resources. They spend much of their time undertaking experiments in their laboratories to discover the properties of the varieties that they hold. However, they do not have the time and the other resources to test more than a small proportion of the huge range of manioc varieties that are actually cultivated by farmers in Brazil. They have no option but to use empirical, morphological and sometimes economic criteria (as opposed to genetic criteria) in undertaking the task of classification. What they do necessarily falls far short of identifying and categorising the immense variety that actually exists.

Agronomists can be torn between conflicting motivations for their work - between the practical goals of their professional work as undertaken in the fields with farmers and the scientific experiments that they carry out in the laboratory. Laboratory work in a university or research station and hands-on work with small-scale farmers in their fields require entirely different skills. Where the agronomist is interested in the genetic properties of crops and the way crops perform in different environments, he or she may be professionally closer to research botanists than to farmers. Yet, unlike most botanists, most agronomists are generalists. As generalists they must grapple with botany, entomology, climatology, soil science, technology, politics, economics and rural sociology. As generalists, in communication with the farmers, agronomists are closer to their world than the majority of

botanists. Yet agronomists are always divided between the farmers' world and that of the scientists.

This division between two worlds partly explains why family farmers essentially see agronomists as outsiders. Education and status set them apart. Also, as we have discussed, the internal logic of agronomists tends to be quite different from that of small-scale farmers. It is the logic of a dominant class and culture. In every one of my case study sites, and despite their commitment to helping the farmers, agronomists were indeed outsiders. None of them lived in the communities or the tiny towns or settlements of the rural interior although, it must be said, some did live in the municipal town. The agronomists and the family farmers live distinct lives in separate realms and, because of this, the relationship of each group to manioc and to its cultivation is distinct one from the other.

Classificatory and naming systems, whether explicit or implicit, reflect meanings that are given by the classifier (into categories) and the namer (of an individual plant variety). In the case of the classification and naming of manioc, this meaning depends on motivation as discussed in Part 1 above and illustrated in table 4-1.

The agronomists with whom I worked, whose work I studied and whom I interviewed for this research invariably had the one single, and conscientious, motivation. This was to provide varieties of manioc to farmers that would enable them to increase their overall yield of roots and to grow varieties that are more resistant to pests and disease. Underlying assumptions about the nature and importance of economic development for small-scale farmers varied among the profession but were rarely discussed. Yet, irrespective of these differences, all the agronomists assumed, without question, that high-yield, pest and disease-resistant varieties of manioc would improve the lives of small farmers. This assumption is further discussed in chapter 6 on the production of the manioc crop.

Some agronomists demonstrated an interest in the end use of manioc varieties with particular characteristics. Others seemed to be indifferent to end use and only to be alert to the yield of varieties - tons-per-hectare. In both cases, the agronomist was thinking of economic development - sometimes without taking into account either sustainability or the appropriateness of a particular development model.

Yet there is nothing arbitrary about the work of Brazilian agronomists, who have their own substantial and well-researched points of reference. Colleagues regularly recommended one or both of two principal text and reference books about manioc. One text, that of

Albuquerque (1969 and subsequent editions) is widely referred to nationally but most particularly in Pará and elsewhere in Amazônia. EMBRAPA-CPATU's specialist in manioc in Belem, Dra. Eloisa Cardoso, was inspired by this agronomist to develop her specialist interest in manioc (pers. comm). Albuquerque was an inspiration to many others in the field including Conceição, who was the author of another reference book which in turn has informed and helped to motivate many teachers of agronomy and others, particularly in Bahia but also elsewhere in the north-east. (Conceição, 1981). To compare and contrast the manner in which Albuquerque and Conceição approach the classification and naming of manioc provides us with some useful insights into the agronomists' world.

Three classification levels relating to farmers and agronomists

Field research in the four case study sites has revealed that agronomists and farmers essentially adopt three levels in their classificatory system for manioc. I have adopted a system of classificatory levels partly because this expresses the logic of the farmers' own practices and partly as a device for organising both my primary data and the analysis of secondary material relating to systems adopted by farmers and agronomists. This device makes it possible to compare and contrast systems of classification and cultures of naming of manioc varieties between these two different realms.

The three levels of classification that I have specified represent the farmers' and the agronomists' way of identifying not only the characteristics of the different plant varieties but also the fact of their presence in the *roça.* In my experience the farmers do not, when discussing and exchanging information about the different manioc varieties, make overt use of this notion of three levels but agronomists do employ *their* distinct classification system in publications and in field trials, for example. Yet it is not just a useful heuristic device for the sake of this study but does represent the logic of these two distinct systems of classification.

It is the naming of plant varieties at the third level that is the critical one for the decisions that farmers make about the actual cultivation of manioc. The names do not fit any schema of the agricultural scientists but they are meaningful to the farmers in their local communities. Neither farmers nor agronomists have any easy way of communicating their third level of manioc classification outside their own realm.

There are greater and lesser degrees of correspondence between the farmers and the agronomists in terms of each of the three levels. The language that farmers use to communicate their classification is rarely identical to the language used by agronomists. Agronomists are less subtle than are the farmers in their first level of classification, more

complicated in their second level and have no systematic schema for the third level other than coding and this is only used for those varieties that are held in gene banks or special collections.

- **Level 1** - distinguishes between perceived poisonous and non-poisonous varieties. This distinction is one that is commonly made and is used in communication with others both within and beyond the farmers' immediate world. For agronomists, depending on their perspective, this is used within and beyond the world of those who are informed about manioc.
- **Level 2** - is the farmers' way of offering a first description of the root (which for most of them is the economically most useful part of the plant). This is mainly used to communicate between farmers, whether local or from elsewhere. For agronomists, level 2 reflects their priorities for determining the characteristics of the most interesting manioc varieties, mainly from an economic perspective. For agronomists, there is confusion as to how these level 2 descriptors are used in communication.
- **Level 3** - represents the way in which farmers classify and name the many varieties of manioc that they cultivate. It reflects that immensely diverse world of agrobiodiversity in which farmers remember or forget old or received names, 'baptise' what (to them) are newly discovered plants with new names, or, alternatively, choose not to name a plant at all because its value remains undetermined. For the agronomist this level of classification, coding and naming is confusing because different referents are used in communication with different types of people ranging from their peers at international level to family farmers in their fields. Scientists strive to define the properties of that minority (a fraction of the total) of individual varieties that they select from amongst those growing in the *roças* for laboratory investigations when they organise and codify and sometimes name the varieties.

I now turn to an in-depth exploration of these three levels as they relate, first to agronomists and, secondly, to farmers.

Agronomists' Classification and Naming Systems

Agronomists classification - level 1: Albuquerque (1969) & Conceição (1981)

Albuquerque and Conceição agree that, for practical purposes, manioc is divided into two main categories: the poisonous and the non-poisonous. Albuquerque's language is simple and communicates with anyone who knows something about manioc. However, Conceição

uses terms designed to communicate, not only to the already informed, but also to other people who may require a clear explanation - a clear warning label in the case of poisonous varieties and a clean bill of health in the case of non-poisonous varieties. The contrasting definitions of the two primary categories are set out below in table 4-4.

Table 4-4 - Comparison of descriptions of Level 1 Classification of Manioc from two influential sources

Source	Poisonous varieties	Non-poisonous varieties
Albuquerque (1969)	*Mandioca brava* or *amargosa* (Wild or bitterish manioc)	*Mandioca mansa ou dôce* (Tame or sweet manioc)
Conceição (1981)	*Mandioca brava, amarga ou venonosa, de utilização industrial* (Wild, bitter or poisonous manioc for industrial use)	*Mandioca mansa, dôce, inócua, de mesa, aipim ou macaxeira, de uso culinário* (Tame, sweet, innocuous or table manioc, aipim or macaxeira, for culinary use.)

Surprisingly, perhaps, Albuquerque's terminology is *not* fully in keeping with the Amazonian cultural usage with which he will have been familiar. This is probably because he wanted to communicate beyond Amazônia. Thus he avoided the two most widely used Amazonian terms for non-poisonous manioc - *macaxeira* and *aipim.* This was an omission that would have confused farmers. As mentioned elsewhere, in Amazônia it is widely assumed that *mandioca* is, by definition, poisonous unless otherwise specified. The term, *mandioca brava* usually signifies a species of *Manihot* that is other than *Manihot esculenta* Crantz. Only when the adjective *brava* is used to describe a specific cultivar of *M esculenta* Crantz does it flag that variety to be particularly poisonous. These nuanced distinctions are further discussed below in the section on farmers' classificatory systems level 1.

The greater subtlety of Conceição's definitions is a reflection of a society, in north-east Brazil and in the south, where there is a need for different kinds of language for different groups of people and where there are no common assumptions as to the nature of different varieties of manioc. Conceição thus chose to emphasise the poisonous/innocuous binary for those who are unsure. It is also significant that Conceição chose to differentiate between the two broad categories of manioc usage ('industrial' and 'culinary' see table 4-4). Moreover, to further classify varieties within level 1, Conceição introduced a semi-scientific scale, based on miligrams/kilogram of HCN[3] in the peeled root. (Table 4-5).

[3] HCN – hydrocyanic acid

Table 4-5: Classifying manioc varieties by degrees of poison

HCN (mg/kg.) of fresh peeled roots	Degree of poison
Less than 50	Not poisonous
50-80	Not very poisonous
80-100	Poisonous
More than 100	Very poisonous

Source: From Conceição (1981)

Agronomists classification level 2

Level 2 is the first description of the root offered. Conceição does not have what I have identified as a second level of classification but prefers to move straight on to a more complex method of sorting varieties. In contrast, Albuquerque adopts an Amazonian construct in his second level of classification relating to the colour of the pulp (compare to Table 4-9 below illustrating farmers' classification level 2). For Alburquerque there are three groups of manioc: white, yellow and what he terms 'intermediate (cream)'. He sub-divides these three groups in the following way:

Group 1 - White-rooted manioc

Subgroup (a) *Mandioca brava*

Subgroup (b) *Mandioca mansa*

(b)i - *macaxeiras*

(b)ii - *mandiocabas*[4]

Group 2 - Yellow-rooted manioc

Subgroup (a) *Mandioca brava*

Group 3 - Cream-rooted manioc

Subgroup (a) *Mandioca mansa*

Some of the assumptions presented in this classification system can be disputed, for example, that only white and cream-rooted manioc can be non-poisonous. It is nevertheless important to highlight that Albuquerque assumes that yellow-rooted manioc is, by definition, poisonous, a claim which my field findings have disproved. (for discussion see Dufour, 1988 and 1993, Nye, 1991)

[4] *Mandiocaba* is not a term used in any of my four field study areas. Albuquerque's description states that it is a type of manioc unsuitable for the manufacture of starch-based foods such as *farinha.* This suggests that it is likely to be similar to, or the same as, the term '*manicoiera*' (see Gurupá classification level 2 in table 4-7 below).

Agronomists classification level 3: naming and coding

The agronomists have the same need to identify plant varieties at Level 3 as do the farmers. They, like the farmers, are experimenters. To an extent they rely on individual farmers to let them know of varieties displaying certain characteristics in which they are interested – then, often following field trials, they need ways to identify and ways of labelling individual varieties just as do the farmers. This they do, initially, by adopting names originally given by the farmer who first showed them the particular plant variety. In so doing, the name of the variety may be wrenched from its cultural and environmental context. If and when a variety is incorporated into an official Brazilian gene bank, of which there were 34 in Brazil in 1997, it will then be given a number commencing with the initials BGM in Brazil. It will also be coded, for international identification purposes. The code for Brazilian varieties commences with the letters BRA-. If the variety is registered in a collection, (a collection has less status than a gene bank) it receives a code number commencing with the initials of the institution housing the collection. (Illustrated in Fukuda *et al.*,1997)

One of EMBRAPA-CNPMF's senior research scientists and extensionists informed me that, in his experience, it was impossible to introduce a manioc variety to a farmer unless it had a name. A number was no good. (Cerqueira pers. comm) And yet in a number of field trials that I learnt about or saw, numbered varieties – with no name – were being used. The agronomist is comfortable with this but the farmer is not. If ever the farmer decides to adopt a variety, the farmer will name it. In one case, EMBRAPA-CNPMF named two successful varieties.

In 2002 EMBRAPA-CNPMF were promoting two new varieties of manioc which they claimed were resistant to root-rot. They had been 'developed' in participative field trials in the state of Sergipe and were launched with a name *and* a code number each. They are *'Kiriris'* (Hybrid 9505/261), a hybrid developed in EMBRAPA-CNPMF and tested in Sergipe and *'Aramaris' (*BGM 116). The variety now named *'Aramaris'*, according to EMBRAPA, was originally collected in the municipality of Castro Alves in Bahia where it is named *'Cigana Preta'* (Black Gypsy), but after field trials in Sergipe, it was renamed for reasons that I was unable to discover. (see EMBRAPA-CNPMF undated leaflet).

It seems as though the research scientist sincerely believe that a *name* will have the same currency among small farmers as a code number has in their data bases. In a handbook on the cultivation of manioc published by EMBRAPA-CNPMF in 2000 they offer a list of varieties recommended for different regions of Brazil. Even if it were not that there are varieties identified only by their code number in this list, the list is of absolutely no use to the

small farmer. EMBRAPA, by publishing such a list, demonstrates its lack of familiarity with the culture and economy of small-scale farmers in the north and north-east of Brazil. For, as follows from my analysis in the section on farmers' classification systems, it is unthinkable that popular names for manioc varieties can be communicated between small-scale farmers in different regions of Brazil in this fashion. (EMBRAPA-CNPMF, 2000:9, W. Fukuda, pers. com., 2002 and EMBRAPA-CNPMF, undated leaflet).

FARMERS' CLASSIFICATION AND NAMING SYSTEMS

Farmers' level of classification 1: 'bitter' or 'sweet' (and wet)

It is essential for farmers to be able to communicate this first level of classification for two reasons. First, the proper understanding of whether a tuber is poisonous ('bitter') or not ('sweet') is, quite literally, life-and-death knowledge. For example, I was informed that a whole family had died of poisoning after buying what they thought was '*aipim'* in the CEASA market in Conquista (BA). The vendor was a young woman who did not know her manioc varieties and had irresponsibly taken the first roots she had laid hands on to town to sell. Stories of this kind, which are not uncommon, usually occur when there is some disruption in a family or community, some event which disrupts traditional communication between kin or neighbours. Farmers, men and women, in Quaraçú told me how careful they are about the selection of varieties to sell in the CEASA in Conquista. One 'sweet' variety, *aipim cacau* is preferred and considered safe by their customers.

Varieties deemed to be poisonous are *mandioca* while varieties deemed not to be poisonous are called *macaxeira, aipim* or *mandioca mansa,* depending on the region. (See table 4-7 below) In three of the four case study areas, 'bitter' varieties were the most highly prized and constituted a majority of the maniocs observed. Only in Quaraçú was the proportion of 'sweet' and 'bitter' varieties nearly evenly distributed. (see table 4-6)

Table 4-6 - Percentage of bitter, sweet and other varieties of manioc observed in 4 case study areas in 2002

Case study	'Bitter'	'Sweet'	Others
Gurupá (PA)	79.4	17.5	3.2
S.D. Capim (PA)	87.8	10.2	2.0
Quaraçú (BA)	47.8	52.2	-
Alagoinhas (BA)	74.6	25.4	-

'Others' refers to *manicoiera* or 'watery' manioc varieties

The second reason for communication on this first level of classification relates to historical preference and knowledge which, with small farmers and some manioc-using indigenous peoples, is an integral part of cultural identity. In three out of the four case study areas 'bitter' manioc was preferred and valued more greatly than 'sweet' manioc. Findings from this field research and a review of the literature regarding the cultivation of varieties of manioc alike demonstrate that manioc farmers distinguish between what we know as the 'bitter' plant and the 'sweet' plant (Rogers & Fleming, 1973, Dufour, 1988 and 1993, Nye, 1991). In Pará, as in other parts of the Amazon, a third category is included in this first level of classification. *Manicoiera* signifies a watery class of 'bitter' or poisonous manioc, which is of no use for making solid foods such as *farinha* and *beijú*. It is used to make *tucupí* sauce, which is common in the Eastern Amazon of South America but is almost unknown elsewhere in Brazil.

Table 4-7 below sets out the different terms used in Portuguese in the four case study sites:

Table 4-7: Farmers' classification of manioc, Level 1

Case study	'Bitter' manioc	'Sweet' manioc	Watery manioc
Gurupá (PA)	*Mandioca*	*macaxeira*	*Manicoiera*
Capim (PA)	*Mandioca*	*mandioca mansa* (or sometimes *macaxeira)*	*Manicoiera*
Quaraçú (BA)	*Mandioca*	*mandioca mansa* (or sometimes *aipim)*	is not used
Alagoinhas (BA)	*Mandioca*	*Aipim*	is not used

Communication

The categories of this first level of classification are used by farmers when they talk about their manioc both among themselves and with their neighbours and, critically, with people living beyond the boundaries of communities and outside their immediate world. So, for example, if an outsider asks a farmer, 'What is that crop?', the farmer would respond using one of the terms presented in table 4-7. One common example of this practice is when the fresh root of a 'sweet' variety is sold in the local market. Here it is sold as *macaxeira* or *aipim.* The terms used in Portuguese, throughout Brazil, vary from one region to another but in the case study areas a farmer needs only use one or two words to alert the outsider (including the agronomist) as to whether he or she deems a plant to be poisonous or not. The exception to this is the use of the term *manicoiera* which is not understood in Bahia and

probably not in parts of Brazil beyond Amazônia. As we shall see, farmers' classification systems at levels two and three are more ambiguous.

Qualifying *mandioca*

The term *mandioca* is frequently qualified by an adjective in all four case study areas. The adjectives *brava* ('bitter' or literally, 'fierce') and *mansa'*('sweet' literally, 'tame') are widely used to add a nuance or emphasis to the descriptive term to indicate the degree of poison present. In both Capim and Quaraçú, people tend to use the word *mandioca* + adjective rather than adopting one of the two widely used terms for the sweet varieties, *aipim* or *macaxeira.* In Capim, the terms *macaxeira* and *mandioca mansa* were both used and seem to mean something subtly different. However, an alternative explanation might lie in the fact that two different traditions of manioc cultivation, each with their different perceptions and uses, have been living in parallel - the north-easterners (mainly from Ceará) and the 'Paraenses', the older, more traditional population (see Chapter 1). It was also common to farmers in the two Bahia sites to describe certain varieties of manioc as *muito brava* or *brava, brava* meaning very poisonous.

Qualifying *macaxeira* and *aipim*

I have never heard anyone emphasise the *innocuous nature* of a variety of *macaxeira* or *aipim.* It is usually enough to classify a plant as 'sweet/tame'. In Pará, I noted that no qualifying adjective at all was used with the term *macaxeira.* It was simple in Pará. There *macaxeira* is perceived as non-poisonous. However the situation in Bahia, where the term *aipim* is used, is more complex.

Aipim might carry a 'warning' adjective. Perceptions and cultural use of language come into play here. There were cases in the Quaraçú case study area when a farmer warned that an *aipim* might present a hazard – but I did not observe this use of a 'warning' adjective with *aipim* in the Alagoinhas area. One elderly man from another part of the semi-arid interior of Bahia even went so far as to tell me: *'Aipim pode matar. A mandioca mansa não'*. (*Aipim* can kill. *Mandioca mansa* does not).

In the Quaraçú area, where 'sweet/*mansa*' varieties were valued just as well as the 'bitter/*brava*' ones, one farmer spoke of a variety of *aipim* that he grew as *brava.* Another farmer near Quaraçú described a manioc as '*quasi aipim'* (nearly *aipim*), denoting caution when discussing classification with myself, an outsider. Conceição (1981) lists a type of *mandioca* called '*aipim bravo´* (*sic*) used in another region of Bahia. To farmers in Alagoinhas this would seem like a contradiction in terms. These farmers grow few sweet

varieties and scarcely distinguish one sweet variety from the other. For them *aipim* is, by definition, non-poisonous.

One possible explanation for this linguistic usage is that farmers in Quaraçú, for example, where the 'sweet/tame' varieties are prized, know and classify all *mandioca* on a spectrum from 'bitter/*brava'* to 'sweet/*mansa'*. In this respect, the system of classification of the farmer in this region is more akin to that of the botanist or other natural scientist who recognise the degree of toxicity of manioc on a single, uninterrupted scale. This phenomenon is discussed by Nye (1991) and others but in relation to 'sweet' varieties only. Problems and confusions can arise in communications between farmers and outsiders (including agronomists) where farmers' confidence in their own knowledge is undermined. For example, when I arrived in Quaraçú, I found that both the terms *aipim* and *mandioca mansa* were being used. As I spent more time in the area, I learnt that farmers there considered the term *aipim* more 'correct'. In their experience outsiders whom they look up to (whether agronomists or extension workers) use this term whereas they use the term *mandioca mansa* among themselves and have done so for as long as the older people could remember.

Table 4-8 below illustrates this observation in Quaraçú. This system of classification is unique, among my four case study sites, to Quaraçú. It shows how, for farmers and botanists, *mandioca* (*Manihot esculenta* Crantz) is classified on a continuum from 'bitter' to 'sweet' whereas agronomists adopt a cut and dried distinction between the two.

Table 4-8: Different systems of classification in Quaraçú, Bahia

Describing levels of poison in manioc – Quaraçú (BA)						
Scale	**bitter/brava**					**Sweet/mansa**
Farmers	*Mandioca /Mandioca man*sa					
Agronomists	*Mandioca*					
					Aipim	
Botanists	*Manihot esculenta* Crantz					

Farmers' classification level 2: the colour of parts of the root

The second level of classification relates to the farmer's perception of the colour of parts of the root. Questions about root colour, for example, the colour of the cortex and the pulp, are just some of the many questions that an agronomist, botanist or ethnobotanist might ask when gathering data to distinguish one variety of manioc from another. Yet in my field research undertaken in the *roça* with farmers, having established that the manioc was perceived as poisonous or non-poisonous, I learnt to ask 'what *sort* of manioc is this?' I did this because I came to realise that, when farmers were discussing types of manioc among themselves or with interested outsiders, they would use a term relating to colour to respond. However, it was only when I had completed my work in Pará and moved on to work in Bahia that this level of classification acquired a special interest for my research. This is because farmers in the two Pará case studies areas classify their manioc by the *colour of the pulp* of the root while - as I found in Bahia - farmers refer, in rather general terms, to the *colour of the skin or peel* of the root.

Gurupá and Capim - Pará

In both these areas, *farinha* is by far the most important food product of manioc (the bitter kinds) and its colour is mainly determined by the colour of the pulp of the manioc root. Other end uses of both sweet and bitter manioc include various types of *beijú*, starches and cakes (which can be of various colours, depending on the recipe) as well as *tucupí* sauce (for which yellow maniocs as well as *manicoeira* are preferred). In fact, there is quite a range of colours with 20 of the 63 (31.7%) varieties of manioc and *manicoiera* in Gurupá and 15 of the 49 (30.6%) varieties identified in Capim being white or cream coloured. This distinction, and its utility for food processing, could explain why the second level of classification of manioc for these farmers relates to the colour of the pulp.

It was notable that, in Gurupá, farmers were precise about the colour of the pulp of their maniocs, especially the yellow ones. This can partly be explained by the fact that *farinha* here is made in all shades of yellow. Table 4 - 9 below illustrates the point.

Quaraçú and Alagoinhas - Bahia

In Quaraçú and in the Alagoinhas region local farmers perceive the colour of the pulp of the great majority of manioc varieties to be white or pale coloured. If, then, farmers assume most maniocs to be white-pulped, this might explain why they have not bothered to develop an explicit classificatory level to denote the colour of the pulp. In the Alagoinhas area, in sharp contrast to the practice in Gurupá and Capim, farmers classify a manioc by the colour of the cortex. In the Quaraçú area there is almost no use of a second level of classification,

but some farmers do talk incidentally about the colour of the cortex or *entrecasca* (peel beneath the outer skin). Only two out of the 49 varieties identified in Quaraçú were described as yellow. (see Appendix 1C).

Farmers in these two Bahian case study areas are producing food stuffs which mainly require white manioc pulp. The *farinhas* of Bahia, which in many ways are quite different from those of Pará, are also usually much paler - with the exception of those which are artificially coloured yellow and marketed at a slightly higher price in markets relatively distant from the place of manufacture. (*farinha Copiapó*). However, manioc food products other than *farinha* are important in both case study areas. In the case of Quaraçú, fresh manioc roots are supplied to the *biscoito* industries of Vitória da Conquista where they are transformed into starch (*goma);* starch is also produced in local *casas de farinha* for domestic production of *biscoitos*, throughout the year and most especially for the feast day of São João on 24 June. *Farinha* and *biscoito* production typically require white pulp. In the Alagoinhas region many types of *beijú* requiring very white varieties of manioc are made for the wider market.

In Quaraçú, where little emphasis was given to this second level of classification, many maniocs were referred to as either white or black - which is never an accurate description of the colour of the cortex of a manioc root. Perhaps light skinned or dark skinned would have been closer to an accurate description. On some occasions farmers were more explicit, describing the colour of the cortex of a root more precisely. Yet in the cases of the manioc varieties which I described in detail during fieldwork in these two areas it was not uncommon for a farmer to dig up a root to show me so that I could see the colour for myself. The farmer may simply not have given much importance to remembering the colour of the cortex of any given variety. The majority of my informants in the *roças* were male. Women workers in a *casa de farinha*, for example, may have recalled the cortex colour of given varieties as they are handling the roots all the time, but I was not able to check this detail.

Table 4-9 below summarises the way in which the second level of classification is used in the case study areas.

Table 4-9 Farmers' classification level 2

Case study	Level 2 classification	Colour terms used
Gurupá (PA)	Pulp colour	• yellow, pale yellow, dark yellow, very dark yellow. • cream, quite pale. • white, very white, dark white.. • pink.
Capim (PA)	Pulp colour	• yellow. • white.
Quaraçú (BA)	Scarcely used - (sometimes cortex colour)	• white • black
Alagoinhas (BA)	Cortex colour	• white. • black, grey. • brownish, pale brown, orangey-yellow, red, pink.

Farmers' Classification - Level 3 - Naming varieties

The third level of classification is constituted by named varieties. For farmers, the naming of varieties and the communication of those names from one generation to another or across more distant geographic and kinship boundaries is part of a cultural tradition. I have concluded from my detailed observations in the four case study sites that the type of names that farmers attach to manioc varieties communicates as much or more about the history and culture of a region as they do about the variety itself.

Farmers name varieties of manioc in ways that do not to conform to any outsider's norm or set of rules from a scientist's perspective. Yet, in each of the case study areas, the ways in which varieties are named - and the ways in which other varieties remain un-named - reveal cultural insights into the history of societies in which farming manioc has been central for many centuries. The significance of the names by which farmers know and track their crop is usually invisible to the agronomists whose culture and interests are so different.

We know of names given to manioc varieties by several South American indigenous peoples (e.g. the Kuikuru (Carneiro, 1983), the Tukano (Chernela, 1986 and others), the Makushi in Guyana (Elias *et al,* 2000), the Amuesha in Peru (Salick *et al.*, 1997), the Aguaruna in Peru (Boster, 1985) the Ka'apor (Balée, 1994a), the Maku and Pirá-Paraná in Colombia (S. Hugh-Jones, 1979 and C. Hugh-Jones, 1979). In these societies the names that people give to

plants are a profound cultural response to the natural environment and reflect equally extensive agrobiodiversity in manioc and a rich diversity of cultures among farmers, horticulturalists, hunters and gatherers, and foragers in the Americas. Manioc varieties are named after people and places, fish, birds and animals fruit and other plants, uses or physical descriptions or mythical uses as well as sometimes in other ways. I have found that many of the insights of the above-named researchers - such as those relating to diversity, creativity and farmers' propensity to experiment and collect - are confirmed by my findings about farming communities. (See Appendix 9).

PART 3

NAMES AND CULTURE

In this section I discuss the findings set out in Appendices 9A-9D regarding the naming of the manioc varieties encountered in the four case-study sites. Appendix 1 also refers.

Names and economic characteristics

Very few of the 214 names of manioc varieties that I discovered during the fieldwork relate to narrowly economic criteria. (See variety name column in Appendices 9A to 9D) Where elements of the second level of classification are important to farmers, such as root pulp colour or the external colour of the root, these colours are regularly found among the names of varieties cultivated in all four case study sites but they represent a small minority of names. Examples include *amarelinha* (nice little yellow) from Gurupá, *aipim rosa'*(pink, sweet manioc) from Quaraçú and *branca leite* (milk-white) from Alagoinhas. In both of the sites in Pará a variety called 'six months' was flagged, presumably because a fast-maturing root was appreciated for economic reasons and was suitable for use on the *várzea* or floodplain.[5] In Capim there was a little-known variety known as '15 kilos'.

Apart from these examples there were no other names that could be related to economic characteristics. Sometimes a prefix or suffix to the name suggested the height of the plant but not the weight of the roots. None of the names indicative of economic criteria are based on the old Tupí-Guaraní language. From this we can conclude that traditional farmers place limited importance on the economic characteristics [6] of the different manioc varieties.

[5] In the *várzea* there is a period of at least 6 months without floodwaters during which time some (a minority) of varieties of manioc can be planted and mature.
[6] The term 'economic characteristics' is used here in the way botanists tend to use the term meaning useful, and also according to the old English usage, economic refers *both* to exchange value *and* to characteristics indicative of particular management practices.

Cultural connotations and perceptions are more significant for the farmers as now move on to discuss..

The provenance of names: people and places

The proportion of varieties named after people and places, names that thus indicate provenance, varied significantly between sites, as I discuss below. In the case of varieties that were apparently named after saints, further work would be required to distinguish whether the name related to the saint or to a place named after the saint. However, on the basis of my findings, I would hazard a guess that farmers do not so name varieties in order to commemorate or honour the saint. This is because, as far as I was able to ascertain, none of the 'saintly' maniocs in my case study sites referred to local patron saints. It seems much more probable that these 'saintly' maniocs were named after places, many of which may be tiny, unmapped communities. However, varieties named after both places and people suggest that they have been imported from elsewhere.

I found many examples of this naming practice during my fieldwork. To cite just one of these examples, one of the very knowledgeable farmers in Bacá, Gurupá, liked to collect varieties. A relative by the name of Guilherme lived in the municipality of Almerim on the lower Amazon, some way upriver from Gurupá. On his return from a visit there, the Bacá farmer brought back 5 sticks of a variety of manioc which he planted and liked very much. It was fast to mature (it matured in six months), was a pale yellow or dark white in colour and it produced a large amount of *farinha* per weight of fresh roots. He told me that he could not remember its original name but had christened it after his relative, Guilherme. It is impossible to know whether the *variety* is old, short of tracing its origins back to Almerim and maybe beyond. However, I could be sure in this example that the *name* was just a few years old because the plant had been adopted and named by my informant, a father of young children possibly in his thirties. In this case we cannot know whether the *variety* is traditional or old but we find out that the variety has been imported from another farmer, thus learning something about the farmer who imported it, *and* that the *name* is a new name for a manioc variety. From many other similar observations of my own and from the other studies cited above, we can conclude that a manioc variety named after a person or a place indicates a variety introduced into a given *roça*, whether or not from afar.

Names and age of varieties

Although we know that *Manihot esculenta* Crantz is a traditional plant, domesticated in the tropical Americas, it has always seemed very difficult to determine the age of the majority of varieties or cultivars. However, anthropologist and ethnobotanist William Balée's meticulous ethnobotanical work with the Ka'apor people (Balée, 1994a), combined with that

of his linguist collaborator, Denny Moore (Balée and Moore, 1994) with five indigenous peoples whose languages are of the Tupí-Guarani group, offers a deep insight into the relationship between language, culture, subsistence and habitat. Balée uses linguistic techniques coupled with elements of the historian's craft to probe the origins of the plant life forms which surround and supply the Ka'apor in their forest environment.

Although my work has been with non-indigenous populations in the four case study areas, Balée and Moore's work is relevant for several reasons. First, the language used in the regions of three of my four studies at the time of conquest was proto Tupi-Guarani and the names of the great majority of manioc varieties mentioned to me in these case study sites were either of Tupi-Guarani or Portuguese origin. The indigenous peoples living in the region of my SW Bahia site at the time of the Portuguese conquest were Gê-speakers, the Camacan (or Camuquem), now extinct. (Hemming, 1987).

Secondly, the influence of ancient indigenous know-how and culture in every aspect of the manioc chain in the communities and among the farming families that I visited is embedded in present day agri-culture and food culture, regardless of the impact of modernisation on the lives of these small farmers. Some interesting results have emerged through applying some of the conclusions of Balée's lexical analysis of the names of plant domesticates in the analysis of my own findings. The results might give us a clue as to which of the known varieties are the ones that derive their names from indigenous peoples and therefore might be the old varieties.

Plant referents

(See Appendices9A to 9D)

Balée finds that '…names for traditional domesticates are never modelled … on non-domesticated plants. Similar linguistic patterns appear to hold for other Tupí-Guaraní languages' (Balée, 1994a:194). As the referents of my case study findings fit Balée's hypothesis it might be that varieties named in this way are among the oldest encountered.

In **Quaraçú**, (the one Gê area - not Tupi-Guarani) the names of varieties of *neither* sweet *nor* bitter manioc are modelled on other plants at all. (Appendix 9C) In **Alagoinhas**, the referents for bitter manioc are two plants, one introduced domesticate (clove - *Eugenia caryophyllus),* which is important in local food culture, and the other a native, non-domesticate tree, Landí (*Calophylum brasiliense* fam. Guttiferae). (Appendix 9D). However, of four referents for sweet manioc, three are domesticates (avocado, pumpkin and cocoa) and one is a non-domesticate imported tree, eucalyptus. In contrast, the names of

several varieties of bitter manioc of **the two Pará sites** were modelled on domesticates, just as in Balée's study. The referents, which are all Tupi in origin, in one site are avocado, papaya and bacuri (*Platonia insignis)* - all valued fruits. In the other site, there are miriti (a type of buriti palm *Mauritia vinifera*), pequi, a tree (C*aryocar brasiliense),* angelim *(Andira cuyabensis*) and *táxi* (a generic term for a type of tree associated with a type of ant in the Tupi language (Aurélio) and which is probably of the Caesalpiniaceae family (Balée *op. cit*.:344). As *táxi* is always qualified (granny's *táxi,* little *táxi*, big *táxi*) it is most probable that the term is used here in its generic sense and thus does not disprove Balée's hypothesis.

Animal referents

When discussing animal referents to the names of plants, Balée finds that

> 'Folk specific names for domesticates may incorporate pre-posed animal attributes, but the animals are not ecologically associated with the plants themselves…. Five of the 18 folk species of bitter manioc names by the Ka'apor incorporate pre-posed animal attributives'. (Balée *op cit.:*196)

As Balée points out, not one of these is ecologically associated with the animal in question. Of the five Ka'apor folk names that he gives, 3 are birds; then there is a tortoise and a viper. (Balée 1994a:196 citing Balée, 1989:14-15).

In this case, my findings also match those of Balée. Related referents, in the two Pará sites, were mainly of fish *(Peixe Boi, Sardinha, Trairá, Apapá and Pirara)* and a tortoise in Gurupá. There were two other fish referents in Capim: *Camarão and Gurijuba*, with a few names relating to reptiles or birds. Also, I was informed that the variety of *macaxeira* called '*maniva jiboia'* in Quaraçú is named after the boa constrictor because the stem is curvy just as is the snake. There was no ecological association between these named varieties and the animals referred to in their names.

Quaraçú stands out in another connection. Here there are two varieties of sweet manioc which are named in relation to horses, unheard of in Amazônia and even in Alagoinhas. *'Lazã'* is the female of a cinnamon or yellow-red coloured horse (possibly a reference to the cortex of the manioc variety), while *'Pingachão'* means 'good-looking horse' (Aurélio). The horse and mule were as important to local transport and trading and for cattle-herding in SW Bahia until about 40 years ago as is the boat to transport and trading in Amazônia.

The only variety that was named after a bird with an ecological connection was in Bahia. In both Quaraçú and Alagoinhas there are varieties called *'periquita'* (sic) probably named after a small parrot, *'periquito maracanã'* (of the bird family Psittacidae), which represents a

grave threat to manioc plants. Flocks of the birds feed on the young shoots of the plant causing severe damage, especially during extended periods of drought. (Farias *et al.*, 2001)

We might then conclude that there is a possibility, based on Balée's lexical analysis, that the folk varieties with animal attributes in their names that have no ecological link to the plant might be old varieties.

Following in Balée's footsteps, and making use of his reasoning, we have presented some reasons for assuming that manioc varieties named after animals, where there is no ecological association between the two and those named after other domesticates could be among the oldest varieties. This analysis is rooted in studies of Tupi-Guarani languages and therefore applies only to three of the four case study sites.

Quaraçú, however, used to be a Gê-speaking area at the time of conquest. It is possible that a few of the names of varieties in this site are very old, although I am unable to confirm this at present as I know of no ethnobotanical studies of Gê-group peoples. There are at least three names which could be old: *Salangó*, locally known as an old variety but sadly little planted today, partly because it takes so long to mature, *Cramoquen*, which takes its name from the now-extinct indigenous people of the region, and *'Sutinga'*. The name '*Sutinga'* was known to the botanist Johann Emanuel Pohl in 1827. (see Rogers & Appan, 1973). According to Aurélio, the word would be of Tupi-Guarani origin. Yet in 1827 Pohl was working in an area occupied by Kayapó Indians who almost certainly were of the Gê speaking groups of Central Brazil. (Hemming, 1987) So this name might, in fact, be Gê in origin rather than Tupi-Guarani. [7]

Pohl, who provided the first monographic study of the genus *Manihot*, identified *Sutinga* as a variety of what he then called *M. utilissima* ('bitter' manioc). He said it was to be found in 'Villa Boa' but by that time called 'Goyas' [8] the capital of the *Capitania de Goiás* from 1749. Further research would be required to explain the connection between SW Bahia and Goiás in the 18th and early 19th centuries. [9] SW Bahia is around 1200 kms. due east of Goias. Yet the linguistic connection between these two locations suggests that some contact

[7] Hemming (1987) writes fully about Pohl's visit to 'Vila Boa de Goiás' and his contact with the Kayapó.

[8] *'Villa Boa, nunc cidade de Goyas dicta, seguentes varietates observavi…'* (In Villa Boa, now called the town of Goyas, I observed the following varieties…) (Pohl 1827)

[9] The main routes of communication to Goiás in the 18th century ran S-N from São Paulo, via Minas Gerais. They brought gold prospectors and supplies from the South and carried the precious metal back to the ports of Rio de Janeiro. The other communication route, used by missionaries, followed the Rio Tocantins from Amazônia southwards to the Central Plateau.

between these populations, even prior to conquest, would have been likely. Without further research, we cannot know whether the *name* alone was carried from east to west or vice versa or whether someone actually took manioc cuttings from the one region to the other.

Names and cultural history

An analysis and comparison of the types of names given to manioc varieties across the four case study sites shows some results that relate to historical aspects of the different societies. Some of the names, discussed above, indicate aspects of the cultural history of societies and other aspects become apparent from the tables in Appendices 9A to 9D..

For example, there is a predominance of varieties named after people and places in Gurupá, with a combined total of 44% being of the preferred bitter varieties. (see table 4-10). This illustrates a culture of manioc varietal exchange in a geographical area that probably extended across at least 3 modern-day municipal boundaries, Gurupá, Porto de Moz and Amapá - and possibly beyond. In contrast, only 18.2% of the varieties in Quaraçú are named in this way. Oral history testimonies of the older people of this region revealed that they were essentially a very sedentary rural population until about the 1950s. The area was on one of the important mule-trading routes, so supplies were always brought in by traders for as long as anyone could remember. Some men were traders and travelled, but most stayed in their area, and no women told me of any mobility. Only one elderly woman whom I interviewed in Quaraçú had arrived from northern Minas Gerais when she was young. She was an exception.

Both Quaraçú and Alagoinhas have relatively high percentages of both sweet and bitter varieties that are named in ways other than those that are associated with plants or animals, people or places. This suggests that a closer look at those descriptive and 'other' types of names might reveal something of interest. (Quaraçú: 63.6% of *mandiocas* and 66.7% of *M. mansas*. Alagoinhas: 61.3% of *mandiocas* and 46.6% of *aipims* - see table 4-10). We have already discussed the possible old names still used in Quaraçú, that are classified in Appendix 9D as 'other'. Alagoinhas has a category of varieties named after actions such as *Fura chão* (dig the ground), *Cria menino'*(bring up the child), *Mata nego* (kill the black man). These names might suggest slave-influence on naming in this area renowned for its sugar estates from the later seventeenth century. Salvador, so near to Alagoinhas, was one of the two major ports of destination for ships in the African trade. (Naro, 2000) Slaves were forced to cultivate manioc for their own consumption in their 'spare time' from other duties.

I set out below the 214 varieties of 'bitter' manioc (*mandioca*) and 'sweet' manioc (*macaxeira/aipim/M. mansa*) observed by type of name for the four case study sites. Table 4-10 is a comparative analysis of numbers of manioc varieties by type and name in the four sites.

Table 4-10 - Comparative analysis of numbers of manioc varieties by type of name in 4 study sites (Ref. Appendices 9A-9D)

Case study site	(a) People and places	(b) Fish, birds, animals	(c) Fruit, plants, trees	(d) Descriptive	(e) Other (or unnamed)	Total no. of plant varieties
	%	%	%	%	%	
MANDIOCA						
Gurupá (PA)	44.0	18.0	8.0	12.0	18.0	50
Saõ Domingos do Capim (PA)	25.6	11.6	23.3	20.9	18.6	43
Quaracú (BA)	18.2	18.2	0	22.7	40.9	22
Alagoinhas (BA)	15.9	6.8	15.9	22.7	38.6	44
Percentage range in each category	*15.9 – 44.0*	*6.8 - 18.2*	*0 - 23.3*	*12.0 - 22.7*	*18.0 - 40.9*	**159**
MACAXEIRA/AIPIM						
Gurupá (PA)	9.1	9.1	0	54.5	27.3	11
Saõ Domingos do Capim (PA)	0	0	0	80.0	20.0	5
Quaracú (BA)	12.5	8.3	12.5	29.2	37.5	24
Alagoinhas (BA)	13.3	6.7	33.3	13.3	33.3	15
Percentage range in each category	*0 - 13.3*	*0 - 9.1*	*0 - 33.3*	*13.3 - 80.0*	*20.0 - 37.5*	**55**

Note:

- The figures under *mandioca* and *macaxeira/aipim* respectively represent percentages of the total number of plant varieties per category (a-e) for each case study site.
- The figures in the final column are not percentages but represent the total number of plant varieties for each case study site and for all four sites taken together.
- The total number of plant varieties is 159 for *mandioca* and 55 for *macaxeira/aipi*, making a grand total of 214.

CONCLUSION

In this chapter, I have presented and discussed contrasting systems of plant classification and naming. The problematic character of these systems, and of the differences between them, is not removed by labelling one particular system as 'scientific' nor is it removed by

assuming that the touchstone for farming practice should simply be 'economic' through, for example, the expert selection of high yield varieties. Classification systems develop, and are developed, out of human experience and grow because humans find a motivation for organising the elements of the world around them. By privileging one classification system, which is that of the professional classes, we run the risk of ignoring the value of local knowledge and know-how, jeopardising the prospects of retaining agrobiodiversity and permitting aspects of our global botanical, cultural and intellectual heritage to erode and to be lost to future generations.

In the course of the chapter I have summarised the botanists' own highly developed scheme for plant taxonomy. I have specified three levels within the classificatory system as used by agronomists and farmers, as a device for the organisation of my primary data. This schema ranges from Level 1, which is defined by the primary distinction between poisonous and non-poisonous varieties, through to a first description of the root for Level 2 and then on, at Level 3, to the 'tracking', naming or otherwise identification of individual plant varieties. This 'tracking' is variously done by agronomists in their collections and by farmers in the *roças* of this or that community.

Level 3, which essentially embraces the ways in which agronomists and farmers name their plants, potentially contains the identities of all cultivated manioc varieties. The observations and analysis of the farmers' locality-based naming systems, and to some extent of the systems adopted by agronomists, are the fruit of primary fieldwork. Within each community or micro-region there are distinctive names for useful varieties that are understood and communicated within the community or kinship group and between generations of farmers - but almost never beyond the group. Even within adjacent communities, the very same manioc variety, identifiable by morphological, botanical and economic characteristics, may well have a different name. The knowledge-base within any one traditional farming community is distinctive to that community, even if it shares the same logic with other similar communities. As such, each particular knowledge-base is unique, and uniquely valuable.

As we have seen, farmers name varieties of manioc in ways that do not conform to any scientific norm or set of rules but which, on closer examination, are seen to have a linguistic and cultural rationale. In each of the case study areas the ways in which farmers classify or group their maniocs, naming some and not naming other varieties, reveal both cultural information and also insights into traditional farming practices over many centuries.

What farmers do is best understood not as the creation of a collection, or a stock, but as a process within an evolving, sometimes dynamic culture.

> '…diversity and knowledge cannot be reduced to a finite stock of well defined, separate entities called varieties, but is, rather, a fluid and evolving process by which farm-grown varieties are continuously gained and lost.' (Elias *et al.* (2000), referring to manioc management by the Makushi of Guyana.) .

The rationale for the farmers' ways of categorising and naming their crop is frequently invisible to the agronomists, whose motivations and interests are so different and who, in relating to the farmer's world, think more in terms of stock. They are forever in search of high yield and pest and disease resistant cultivars and in their search rarely notice the *process* to which Marianne Elias refers.

> 'The Ka'apor may not boil flowers, measure cotyledons, or count chromosomes, but throughout their lives they do see, touch, smell, and taste the living botanical diversity of their homeland' (Balée (1994a:169, comparing the access of the indigenous population to the access of systematic botanists).

The farmer is an experimenter who, in experiments with varieties, needs to be able to identify these as individual varieties. When for whatever reason a variety seems to be of interest, whether this is economic or simply aesthetic, the plant will be 'baptised'. It will be given a name, or a name will be culturally registered. Before that moment it is simply classified as 'unknown'. I found this to be the common practice in all four case study sites. From the 'naming' point onwards the farmer will be able to communicate about the results of the experiment with others in the family or community. That particular variety will, so to speak, have entered the family. The manioc thus named enters the world of cultural significance which, in the sites of my case studies, can be ordered into different 'domains' - fish, birds; people; plants etc. Nobody in the rural communities really knows the origins of the ancient names of maniocs. Yet they may well know the associations in the natural world of a name. Some farmers, especially the older and more expert amongst them, may remember the provenance or hazard a guess at the age of a particular variety. The name may have been given by an ancestor. Where it has not and is merely descriptive (e.g., *mandioca amarela* (yellow manioc) which came from São Paulo to Gurupá), it is probably still being observed and evaluated or is not considered to be an important variety within the farmer's collection.

The genetic diversity of the plants is matched by the cultural diversity entailed in the systems of naming. The names, with their different meanings and associations, enter into the decisions that the farmers from time to time make about which particular varieties to cultivate, to experiment with, to add to their 'repertoire' - or perhaps (for a time at least) to

cease cultivating. The names, recallable at will through people's memories, constitute an essential part of the knowledge-base of the communities. They are a means of connecting specific know-how about manioc varieties with the environment in which the farmers live. Theirs is an orientation towards the practical and the useful.

> 'There is no model to falsify; knowledge is not true or false, only more or less effective…. Local knowledge … is practical. Rather than studying how plants and animals are constructed and how they evolved, local knowledge explores how they can be found, harvested and used. This encourages the development of an intimate knowledge about the environment.' (Kalland, 2000:325)

In contrast with the scientific and market-oriented practice of the agronomists, the farmers' practice, including its experimental aspects, is just as much practice-based but is cultural in character and generational in its scope.

CHAPTER 5

GENETIC DIVERSITY IN MANIOC

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INTRODUCTION

The previous chapter dealt with the local knowledge of small-scale farmers and demonstrated how their ways of classifying and naming plants is integral to their culture and constitutes a logic that is outside the realm of most scientists and other outsiders. The analysis of classification and naming systems, which is set out in Chapter 4, is based on the ethnobotanical data that I collected during fieldwork in the four case study areas. In this chapter, after reviewing the relevant literature, I present and discuss other issues that are related to this data, including the different economic characteristics of the 214 varieties that I set out in four tables (Appendix 1). I examine some of the advantages for the farmers of maintaining a dynamic system of agrobiodiversity in this single crop and analyse the evidence, in so far as it exists, for the erosion of crop diversity. [1] I identify some of the reasons for threats to this diversity, thus preparing the ground for further examination of the issues in subsequent chapters. These issues include the reasons for the erosion of genetic diversity that, to my knowledge, are not addressed in the existing literature on manioc.

THE MANIOC SCHOLARS

In order to place this research into the context of other work on *Manihot esculenta* Crantz, I first review some of the literature that has served as a foundation for my work and that has contributed to the development of my own perspectives. In the previous chapter I have noted the distinctly different ways of thinking of, on the one hand, family farmers and, on the other hand, of the agronomists and botanists. In like manner, in this chapter I find that those whom I call the 'manioc scholars' also fall into separate categories. The large and authoritative body of technical publications, despite its scientific value, scarcely addresses the importance of manioc genetic diversity and of small farmer management strategies. However, there is a different literature that redresses this balance and to which my work relates much more closely. This other literature is mainly that of ethnobotanists and anthropologists – and also of some archaeologists and geographers – much of which has been inspirational for this study. However, despite the strengths of this literature, I know of

[1] '*In situ* conservation …is meant to maintain a living and ever changing system, thus allowing for both loss and addition of elements of the agroecosystem. …we must accept that the *in situ* conservation of crops would fail and collapse if it attempted to stop change or to preserve an agroecosystem in a particular state. …The goal of *in situ* conservation is to encourage farmers to continue to select and manage local crop populations.' (Brush 2000:8-9)

no work in Brazil (or elsewhere) that goes so far as to advocate *in situ* on farm conservation of a wide genetic resource base *specifically* of manioc, *by* small-scale farmers *and* in their own interests. [2] This study is intended to address this gap. It both draws on and contributes to the research of numerous other scholars who have studied manioc from their different disciplinary perspectives.

In the two most recent and authoritative overviews of contemporary perspectives on cassava (sic) (Hillocks, Thresh and Bellotti, 2002 and (*Euphytica*, 2001), only a single paper directly addresses traditional management of manioc genetic diversity (Elias *et al.*, in *Euphytica*, 2001), although Henry and Hershey's overview of cassava in South America and the Caribbean is sensitive to issues of traditional management and *in situ* conservation of genetic resources. (in Hillocks *et al., op. cit.)* Although some other studies refer to manioc varieties and to their various agronomic characteristics, the great majority of manioc specialists have ignored the importance of *in situ*, on-farm genetic conservation. Nonetheless, all of this work has provided the essential starting point for this study on agrobiodiversity in manioc just as has some of the work of the anthropologist Stephen Brush and his colleagues. Brush is the designer of a global programme for on-farm conservation of crop genetic resources for the International Plant Genetic Resources Institute (IPGRI) and, although he does not specifically write about manioc, his work on potatoes, maize, wheat and other world crops is of direct relevance to my work. (Brush, 2004)

The work of scientists in a number of international research institutes and in Brazil's EMBRAPA represents a very significant body of scholarship. [3] Most of these institutes are part of the Cassava Biotechnology Network (CBN). The *Centro Internacional de Agricultura Tropical* (CIAT) in Colombia, who are holders of the world's main collection of *Manihot* germplasm, manages a particularly useful and varied website with appropriate links. The books of the notable Brazilian agronomists, Albuquerque (1969) and Conceição (1981), have been referred to earlier in this study. In the Brazilian context, the Brazilian Association

[2] There is no reason to believe that the interests of small farmers are the same as those of other agents or that there is some collective 'we' in which all interests - and all losses - may be merged. 'If 'we' lose Andean folk taxonomy for potato varieties, to use a famous example, this can be defined as very different losses of 'value': the loss of knowledge vital for a certain village economy, the loss of a cultural good for a certain community, and maybe also the loss of power for certain people within this community. The loss may also entail a loss of knowledge that facilitates screening of potato germplasm at the Sturgeon Bay or Brunswick collections, or the loss of a source of extra profit for a potato breeder in France, the loss of work for ethnobotanists, the loss of a source of income for Andean market women, the loss of a cultural heritage of humankind, and - not to forget! - a loss for scientists writing articles about development issues.' (Flitner 1998:164)

[3] Among these publications, apart from EMBRAPA's own numerous and invaluable papers, booklets and reports, those most relevant to this study include Cock (1985), Plucknett *et al.* (1998), Westby (1999) and Westby and Graffham (1999) and Matos *et al.* (1997).

of Manioc Starch Producers (ABAM) has been actively networking among research scientists and economists as well as national and multinational corporations. The purpose has been to provide a serious research base for 'modern' businesses in the manioc starch and *farinha* sectors, which are mainly located in the south of the country. ABAM's website makes available for general use a large body of research findings, data and analysis.

Some of the economists in EMBRAPA-CNPMF in Bahia are amongst the social scientists who have thrown light on the relationship between the 'modern' manioc sector in southern Brazil and the family farming sector in the north and north-east (e.g., Cardoso *et al* 2001, Cardoso, 2003). Professor Tereza Ximenes, sociologist and researcher at the Federal University of Pará (NAEA), wrote her doctoral thesis about small-scale manioc production in an area in the Bragantina region of Pará (Ximenes, 1995). Today, as a joint coordinator of PLEC, she continues to contribute to our understanding of this aspect of Amazonian resource management (see Pinedo-Vasquez *et al*, 2003). I have already referred to the paucity of studies in the area of my own research in Bahia but one recent study on the economic and agro-industrial aspects of manioc farming in Bahia is well researched in its subject area (Torres Filho, 2002). In north-east Brazil a number of young researchers in a variety of disciplines are breaking new ground in Masters and PhD dissertations that contribute to our knowledge about aspects of the local environment and of local and regional history. The Master's thesis of Joana Espinal (1981) is one such study and provides insights into the organisation of the *Casas de Farinha* in the Recôncavo region of Bahia around Salvador.

The practically orientated work of some social scientists and agronomists within the Belém-based *Instituto de Pesquisa Ambiental da Amazônia* (IPAM - Environmental Research Institute of Amazônia) in the municipality of Paragominas focuses on small-scale food production in the interior of Pará.. Pereira and McGrath (2001) draw attention to the significance of traditional agriculture within an area that was once but is no longer forested. The results of this 5-year project provide a counterbalance to other studies in this geographical area that focus on forestry management and on the conservation of forest resources but that neglect small-scale agriculture.

In the first part of Chapter 4 I discuss the seminal contribution of botanists Rogers, Appan and Fleming and, more recently, of Antônio Allem, to our understanding both of the genus *Manihot* and to the species *Manihot esculenta* Crantz as well as of the two subspecies that have been identified by Allem (see Table 4-3). The work of a number of social scientists, in particular those of anthropologists and ethnobotanists, provides an important part of the foundation for my own study. These researchers have studied not only traditional and

indigenous management of manioc but also the range of varieties that are cultivated and the reasons that farmers have for cultivating such diversity within their traditional crop. However, all the works in this area that I am aware of relate to Amazônia and none to the north-east. [4] The present research begins to address this gap in ethnobotanical studies in the north-east.

Before moving on to discuss some key recent work on traditional management of manioc diversity, I would note that there are two particularly valuable edited collections of papers on the theme of resource management of forest peoples. These bring together the work of many of the key researchers in this field. The volume on indigenous and folk resource management strategies in Amazônia (Posey and Balée, 1989) is complemented by a later volume that focuses more on the management of food resources, again in tropical forest areas of the world (Hladick *et al*., 1993). Sadly, what is lacking in this area of research in relation to Brazil is an equivalent scholarship relating to the north-east region.

Laure Emperaire provides a valuable overview of 80 ethnobotanical studies of this kind in the Amazon area: Brazil and also Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana and Surinam. (Emperaire, 2001) Her work breaks new ground in that it introduces the concept of agrobiodiversity into the conversation even though the studies that she reviews had not been framed in this way. The map that accompanies her review demonstrates the divide between those who mainly use 'sweet' varieties of manioc (in Acre in western Brazil and in the Andean countries) and those who mainly use the bitter varieties (in north west, central and east Amazônia).

Even if she is not the first researcher to study the way in which non-indigenous populations in Amazônia manage manioc, Emperaire is the first to systematically document the varietal diversity that some of these populations cultivate. She is the first also to compare and contrast these practices with those of some of Amazônia's indigenous peoples. Her study, with Florence Pinton, in Altamira, a recent area of colonisation since the 1970s, helps us to understand manioc management among this type of population in that she discusses both varietal diversity of manioc *and* markets (Emperaire and Pinton, 1999). Emperaire and Pinton also discusse the reasons for differences in diversity between one people and another and the causes of loss of diversity. In this sense their work is a precursor of my own because they trace the links between the rural economy in the Altamira area of Pará, manioc varietal diversity and small-scale farmers' management of their crop. My own work extends their

[4] The State of Maranhão, classified as part of north-east Brazil, is nevertheless considered in some of the literature under review. However, other states of the north-east are not considered.

analysis to include consideration of small-scale farmer management of manioc and also introduces the dimension of manioc foods production *as well as* the production of the crop, followed by the distribution, exchange *and* consumption of manioc foods and other manioc products.

The eighty studies reviewed by Emperaire differ conceptually and differ also in their methodological approach. Nevertheless, some research such as that of Jan Salick and her colleagues with the Amuesha in Central Peru (1995 and 1997) and later of Hamlin and Salick (2003) - in which they review changes in Amuesha agriculture over a 15 year period [5] - is at a level of scientific and ethnobotanical detail that renders these publications among the most helpful. James Boster's study of the evidence of the 'Perceptual Distinctiveness' of the Peruvian Aguaruna (1985) is highly informative in the application of his chosen methodology in determining the classification practices of this indigenous people. William Balée's ethnographic and ethnobotanical work among the Ka'por is an excellent example of rigorous, systematic work with a forest indigenous people. Although it does not focus on manioc (although manioc is included), it does provide a solid methodological framework for undertaking this type of research Balée, (1994a). Other outstanding ethnobotanical and botanical studies of manioc and manioc management in Brazil include the work of Janet Chernela (1986), Kerr (1986) and Carneiro (1983). Other important work has recently been undertaken by a multidisciplinary group of French researchers in Guyana. These are Grenand (1993) and, separately, Elias *et al*, (2000 and 2001), Rival (1998) and McKey and Beckerman (1993) and McKey *et al.* (2001). These last three researchers have also co-published with Emperaire.

Margaret Nye's work (1991) on the cultural distinction between 'sweet' and 'bitter' manioc has made an important contribution to our understanding of cultural attitudes to the processing of manioc. Following a wide literature review of researchers who address the complexities of classifying manioc into 'bitter' and 'sweet' varieties, she emphasises Rogers and Fleming's assertion that 'there are no known morphological or ecological characteristics that can be associated with these levels of toxicity' (Rogers and Fleming, 1973). Nye argues that the main distinction between cultural treatment (the production of the crop and the food) of manioc is not so much in selection for more or less toxic varieties but rather in the manner in which the roots are processed to produce the culturally desired

[5] Hamlin and Salick note that in this 15 year period 'Percent cover, planting density, field size, and diversities of species, field type, and height class did not change in fields….In home gardens, species richness persisted…Agents of conservation included community land titles, immigration restrictions, a national park, protection [of] forest and communal reserves.' (2003)

main food. In other words, she suggests, just because some peoples adopt complex technologies to remove the hydrocyanic acid from manioc does not mean to say that the roots processed are highly toxic - but rather that the people want to make *farinha*. She challenges Darna Dufour, who worked with the Tatuyo people, because she accepted local classification of manioc into 'sweet' and 'bitter' varieties and only tested the so-called bitter varieties for degrees of toxicity, omitting to include locally perceived 'sweet' varieties in her sample. (Dufour, 1988)

Other anthropologists have also contributed to our understanding of the way in which manioc is managed by the indigenous peoples of the Amazon region and also of the cultural significance of the plant and the food among Amazonian peoples. Such studies include those of Christine Hugh-Jones (1979) and Stephen Hugh-Jones (1979), who worked in Colombia, William Balée and Anne Gély (1989), working in Brazil, and Darrell Posey who worked with the Brazilian Kayapó (1994). Christine Hugh-Jones's chapter on the production and consumption of manioc foods and drinks and the interpretation of foods among the Pirá-paraná people of the Colombian NW Amazon (1979) has contributed to our understanding of the relationship between food and social reproduction. [6] Her work also extends our knowledge base of the material culture of manioc-cultivating peoples. [7]

These researchers, in their many different ways, have inspired the multidisciplinary approach that I have adopted for this work, which is represented as the Manioc Chain, the subject of later chapters. In this chapter I focus on genetic diversity in manioc and analyse the empirical findings of fieldwork in the four case study areas.

GENETIC DIVERSITY IN MANIOC IN THE FOUR CASE STUDY SITES

This section focuses on two related issues: the number of manioc varieties that are to be found in various localities in Amazônia and in my four case study sites, and the possible degree of erosion of this genetic resource and its associated knowledge-base. My research

[6] In Christine Hugh-Jones' anthropological analysis of the physical and mythological universe of the Pirá-paraná, she traces 'the various ways in which processes of production and consumption of various foods and drugs are both directly and metaphorically related to the processes of physical and social reproduction of social groups…these creative processes are related to one another as wholes…they exist between the different types of transformation with which the processes are concerned.' (C. Hugh-Jones, 1979:234).

[7] The work of Jens Yde (1965) and Linda Mowat (1989) are examples of the sources which enable us to comment on the material cultures associated with manioc processing and the diversity of food processing techniques. Yde worked with the Waiwai of Guyana. Linda Mowat, an archaeologist and museum researcher, published an illustrated review of manioc-related objects from Amazônia. Yet by far the most significant contribution from an archaeological point of view to our understanding of the history of the way manioc used to be cultivated and processed is found in the work of Anna Roosevelt, especially in her seminal study of prehistoric maize and manioc subsistence along the Amazon and Orinoco. (1980)

builds on and extends what has already been established, or suggested, by previous work in this area.

The meaning of numbers

Before embarking on this brief quantitative discussion about the number of manioc varieties identified in various locations in Brazil, I should emphasise that the varieties that are being considered are those that have been *selected* and *developed* by indigenous, 'traditional' and family farmers over generations and generations. This means that the numbers that we are discussing represent *useful* cultivars and, in the case of my inventories, also cultivars that are under observation (in the case of those whose names are recorded as 'unknown'). The varieties are useful to particular people in their specific geographical and socio-cultural environments. In many societies, including in the micro-societies of my case studies, there has been a free exchange of planting material among farmers, both within communities and more widely. This system of networks reflects a philosophy of commonality and solidarity that is beginning to break down in some areas, as we discuss in Chapter 8. It is a system that ensures a flow of genetic resources and that enhances the diversity and thus the robustness of the crop and, for example, its resilience to degeneration and disease. (See Bellon, 2001 for further discussion.)

It took thousands of years to achieve the great genetic diversity of this and many other food crops. The loss of genetic diversity can be very rapid and is linked to the process of cultural impoverishment and discontinuity in rural societies as they attempt to adapt to a dominant philosophy which does not value crop genetic diversity.

> '…for all major crops, diversification was at a maximum by the end of the land race phase of crop development. This process is now in reverse. The diversity of land races that supported agriculture for the past 9000 years is being rapidly eroded and, for some temperate crops, is now nearing completion. This has happened through the substitution of new, genetically uniform cultivars that also have become more uniform through application of increasingly sophisticated agronomic practices, including improved tillage, irrigation, artificial fertilizers and the chemical control of pests and disease … *The rapid rate of destruction of crop variability is in sad contrast to the rate of its creation - about 100 years compared to 5,000 to 10,000 years.* (Holden *et al*, 1993 cited by Nazarea, 1998:9) My emphasis.

The extent of our knowledge of genetic diversity in manioc among small-scale farmers in Amazônia

Laure Emperaire's review of the 80 studies in the Amazon reveals the range of varieties that are to be found in different localities. (*op. cit.* 2001) The review shows just how difficult it is to compare one study with another. This is because each researcher has used a different methodology. The different research projects have been carried out over different lengths of

time, with differing numbers and characteristics of informants, and in different places - each with its own particular cultural, economic and environmental features. However, all these case studies have had at least one feature in common, in that they have documented the number of varieties of manioc that were found in the particular geographical locations.

Emperaire presents the data from her review as a 'preliminary synthesis' that provides us with a 'first estimate' of maniocs cultivated in Amazônia. In Table 5-1, I present a small selection of the numbers of varieties documented by some of the researchers referred to in the review who have conducted methodologically rigorous ethnobotanical studies. I reproduce this as illustrative data to show the range, that extends from two regions with the highest genetic variety yet recorded to others with fewer varieties, including a region of colonists. This illustrative material is also presented to confirm what is surprising not only to many Brazilian agricultural scientists but also to my farmer-informants themselves, namely, that so many varieties of manioc are to be found in diverse localities in the Amazon basin.

Table 5 - 1 An illustrative selection of Amazonian sites: total number of varieties of manioc documented (from Emperaire, 2001)

Source	Sample	Location*	Varieties		Total
			Sweet	Bitter	
Chernela (1980)	1 village	River Uapés, Upper Rio Negro, Brazil. Tariano.	0	62	62
Salick *et al.* (1997)	16 communities	Rio Palcazú, Peru. Amuesha	204	0 (?)	204
Elias *et al.* (2000)	1 village of 30 families	SW Guyana. Makushi.	0	76	76
Boster (1983)	4 villages	Rio Santiago, Peru. Huambisa.	± 100 (?)	0	±100
Balée and Gely (1989)	2 villages of 5-13 families	North of Maranhão. Brazil. Ka'por.	2	17	19
Pinton and Emperaire (2001)	26 farmers	Altamira, Rio Xingú. Non-indigenous colonists.	14	27	41

* Note: The location indicates both the geographic location and the people among whom the research was conducted.

Genetic diversity and memory in the four case study sites

My own data, that is set out below in Table 5-2, demonstrates that the varietal diversity found in each of the four case study sites - between 46 and 61 varieties - is higher than the median suggested by Emperaire's review. In her review a diversity of more than 40 varieties was recorded only in 19 out of the 80 study sites. On the face of it, this would suggest that agrobiodiversity in manioc is a robust system reproduced by farmers in relatively settled

rural communities wherever they are, whether in the Amazon or in Bahia. However, when we probe a little further, we begin to see a changing picture.

In the previous chapter I analysed my ethnobotanical data from the perspectives of naming and classifying varieties, including the type of classification that divides them into 'bitter' and 'sweet' (see Tables 4-6, 4-7 and 4-8 in Chapter 4). At this stage it is important to recall that the varieties of manioc represent *both* those actively cultivated at the time of the fieldwork *and* those varieties mentioned and remembered by local people. In some cases, varieties mentioned by one person were mentioned by others too although it was not always possible to see all the plants actually growing. In some cases, one informant might have mentioned a variety that he or she thought no longer existed only for me to subsequently identify it elsewhere in the area during fieldwork. Sometimes varieties really did seem to be 'historical'. Y*et all* of these varieties constitute part of the knowledge-base of the farmers of the area and thus hold their legitimate place in my records. [8]

In documenting my field data, I have provided a record of extant knowledge in keeping with my focus on farmers and their 'technical' as well as their cultural practice. This contrasts with the practice of agricultural extensionists who, in considering manioc varieties under cultivation, consider only the characteristics of the plant. Also, without any exception that I am aware of, they are concerned only with those varieties that occupy most of the planted area in the *roça* and not with the minority varieties. Thus, for example, I was initially briefed that in the whole municipality of Gurupá altogether 24 varieties of manioc were planted. (Gouveia *et al*., 1997) This compared to the 61 that I eventually identified in the community of Bacá alone. In Capim, the participative appraisal of the municipality documented no more than 12 varieties (Pro-Renda Rural, 2001) compared to the 48 named in my study. At least *some* manioc diversity had been documented in relevant reports in these two Pará sites but this type of data was not available to me at all in Bahia.

[8] In the case of one 'historic' variety named in SW Bahia (Salangó), it was named and praised so widely by local farmers that I was determined to try to find it growing. Eventually I found it, outside the area, in the *roça* of a very traditional farmer who was growing many very late varieties that only matured after at least 3-4 years. Despite the fact that Salangó was resistant to the worst pest and disease problems of the area and was not only a high-yield variety but also reportedly made good *farinha* it seems to have been abandoned because it could not be harvested before about 5 years.

Table 5 - 2 Total number of manioc varieties documented in the four sites of this study, two in Pará and two in Bahia

Source	Sample (1)	Location	Varieties (2)		Total
			Sweet	Bitter	
Stocker fieldwork 2002	14 informants. 1 village and local town.	Gurupá, Pará	11	50	61
Stocker fieldwork 2002	13 informants and 4 group discussions, mainly from 3 communities and local town.	Capim, Pará	5	43	48
Stocker fieldwork 2002	27 informants, mainly from 3 communities.	Cândido Sales, Bahia	24	22	46
Stocker fieldwork 2002	20 informants and 2 group sessions, mainly from 4 communities and 2 local towns.	*Agreste* of Alagoinhas, Bahia	15	44	59

(1) Informants included a total of 59 farmers and 15 others. These other sources of information were members of farming families and other people with whom I had informal conversations as well as local extension agents and agricultural scientists whom I formally interviewed.
(2) As will be seen from the tables in the Appendix 1, there is no guarantee that each of these named cultivars, which I call 'varieties', is different one from the other. It is, however, reasonable to assume that they are different unless a local farmer expresses any doubt. Only laboratory tests could determine the matter for certain.

The question arises of whether this significantly - although not uniformly - high degree of diversity is being sustained in the case study areas. To provide a definitive answer we would need to analyse all the available quantitative data as well as the equally important qualitative aspect of fieldwork findings as these relate to farmers' knowledge and know-how *and* to the social and political environment in which they live. Emperaire and Pinton emphasise the relationship of farmer's perceptions and naming strategies to genetic erosion.

> 'It is the loss of a process of learning and not so much the loss of the biological material that renders vulnerable the diversity.' (Emperaire and Pinton, 1999)
>
> The loss of the perception of diversity as a resource accompanies the impoverishment of knowledge, practices and ways of transmission of these knowledges. The loss of a name of a variety and of its interest in the context of a system of production anticipates the loss of the biological object.' (Emperaire, 2001)

There was ample evidence of the loss of perception of diversity in all four case study sites. I will return to discuss this below.

I have analysed my own quantitative data so as to try and identify the degree to which there may have been an erosion of genetic diversity - and to contribute to a search for possible

reasons for any such loss. My own research in Bahia as well as in the Amazonian state of Pará has provided a basis for conducting this analysis. In the four sections of Appendix 1 (A-D) there is a record of all the varieties reported on and/or observed in each of the four case study sites. The key distinction is between:

1. those varieties that I was able to definitely confirm were *still* being grown in one or more local farms within the site area (G – column 2 in appendix)
2. those varieties where, for whatever reason, I was not able to confirm that they were still being grown locally [9] (R – in column 2 in appendix)

These two categories are distinguished in Appendix 1 and the analysis is summarised in Table 5-3 below. It has been possible to make this distinction because amongst my informants in each site were a number of older farmers, who could remember varieties that they had once cultivated. However, it was apparent that younger farmers, especially in Bahia and also particularly those who were beginning to practice agriculture in a more commercial way, had as their principal motivation for growing manioc the selling of the fresh roots on the market. This was opposed to the practice of those mostly older farmers who were growing it primarily for domestic use and only secondarily for a market surplus. (See Chapter 8 for fuller discussion.)

The erosion of knowledge that goes hand in glove with the movement into production mainly for sale, and therefore the preoccupation with high yields, varies from place to place in direct relation to the propensity of family farmers to produce in quantity for the market. The corresponding neglect of lower yielding, minority varieties is one of the significant changes that is occurring in the manioc-growing areas of north and north-east Brazil. As Laure Emperaire has observed, the loss of *perception of diversity as a resource* among farmers is, in many ways, the beginning of the end for agrobiodiversity.

Table 5-3, then, is indicative of the gap between the total knowledge of diversity in a community and current practice. We see that in Gurupá 82% of the varieties named can still be identified in the *roça* by the person who remembers the variety. This would suggest a relatively robust and diverse system. The motivation for farming is still largely subsistence, no mechanical equipment being used for making *farinha* and only very small quantities of *farinha* being sold, by the farmers themselves, in the local town. (See Chapters 6-8 for more discussion.)

[9] This category covers *both* those varieties that my informants regarded as 'lost' *and* others for which their knowledge was insufficient to make a judgement one way or the other as to whether they were still being cultivated locally.

In the other three case study areas it is a different story, with rather fewer of the 'remembered' varieties still being cultivated. In Capim, in contrast with Gurupá, many farmers are producing *farinha* for the local and regional market and they use mechanical graters in their *casas de farinha* that enable them to produce larger quantities of the product. Cattle-ranching is beginning to squeeze farmers off their land, which in some cases renders it well nigh impossible for them to leave fields fallow for any useful period of time. Shifting cultivation becomes difficult if not impossible. With 29 varieties still being grown, and 19 varieties remembered in Capim, the earlier more diverse system of manioc farming might be starting to erode. A similar story seems to be emerging in Bahia although farming in each of the two Bahian case-study sites is more uneven: more 'modern' systems of manioc farming still co-exist with more 'traditional' or independent systems. This means that there are still some important expert farmers working in the area and, among some families, there is still considerable involvement of younger children in farming and food-production activities. This would suggest that transfer of knowledge and know-how is still taking place although most certainly this is to a much more limited extent than happened in 'the old days'. That was the period, fifty to sixty years ago, when some of my oldest informants were children, working full time in agriculture and usually without access to formal education.

Table 5 - 3: Total number of manioc varieties known and still being grown in the four case study sites and possible loss of diversity

Site	Total documented	Total still grown	% Still grown	Possible loss*
Gurupá, Pará	61	50	82%	11 varieties - 18%
Capim, Pará	48	29	60%	19 varieties - 40%
Cândido Sales, Bahia	46	24	52%	22 varieties - 48%
Agreste of Alagoinhas, Bahia	59	33	56%	26 varieties - 44%

*Possible degree of varietal loss in living memory. Note that, as some varieties are lost, new varieties are introduced from various sources. This column represents the *possible* overall loss in each area.

A reflection on staggered harvesting times

Of the many advantages that accrue to family farmers when they maintain a good range of manioc varieties, one that is worth a special mention is that they can stagger their harvesting, not just for a single variety but also among varieties with different characteristics. Manioc, unlike most crops, can be effectively stored in the *roça* over a period of time until it is convenient to harvest it. Of course, there are opportunity costs. As the farmers well know, a decision that they might make to delay harvesting a particular crop would have the effect, for the time being, of neutralising the land in question for any further planting. However, the

advantage to farmers of the system that they operate is that the whole *roça* does not need to be harvested at once. We discuss other aspects of harvesting in Chapter 6 but here I focus on one key aspect of farmers' management of agrobiodiversity.

Practically orientated agronomists such as Conceição (1981), for example, discuss at some length this phenomenon of the timing of harvesting. Conçeição recognises the range of factors that impact on the farmer's decision as to when to harvest the crop from the agronomic, through the environmental to the economic. [10] He also recognises that farmers themselves are the first to know the most appropriate time to harvest the crop. This will vary in accordance with changes in soil humidity, the amount of starch or fibre present in the roots at any given time, the culinary properties of the root at any given time and the quality and yield of the roots in terms of *farinha* and starch. (*op. cit*.:228) Yet Conceição does not discuss the advantages of maintaining many different varieties in a *roça*, this being a planting system that gives the farmer considerable flexibility.

I present some information about the way in which harvesting can be staggered for a total of 61 varieties over the four case study sites in Appendices 8A-8D. The figures present some quantitative data that emerged during analysis of the ethnobotanical information (Appendix 1). However, as I was not employing quantitative methods of social research during fieldwork, I am only able to present this data on a preliminary basis as possibly being indicative of actual harvesting practices. In fact, these results raise some new questions without providing any definitive answers. The figures enable us to see that, in Gurupá, farmers are harvesting most varieties over a period of 12 months. This period is much shorter in all three of the other case study sites (6 months for Capim and SW Bahia and 8 months for Alagoinhas). The figures also enable us to see at a glance that harvesting normally commences 6 to 8 months later in SW Bahia than in any of the other three sites. [11]

[10] **Table: Factors to be taken into consideration when deciding on harvesting time**

Agronomic	Environmental	Economic
Early, semi-early or late variety	Condition of the soil and climate	Markets and prices of the products
Phenomena observation during the cycle of the cultivar or location	Amount of weeds present	Availability of labour and support services
Condition of the different locations during harvesting	Situation of the access roads to the fields.	Time pressures
Planting systems		Commitments

Source: Conceição, 1981:228

[11] SW Bahia presented a distinctive phenomenon. A number of older, remembered varieties were harvested very late, from 3 and even up to 8 years. I was not able to determine precisely why this was the case. Could it have been for cultural reasons? Had local farmers once left certain varieties in the ground for a very long time because they felt this to be interesting and/or advantageous? Or is this late harvesting to do with the climate and soils? Or are these very late varieties ancient ones that have not yet been lost to local memory? This phenomenon would merit further investigation in this most interesting of regions.

It is tempting to conclude from these figures that farmers in Gurupá, practising as they do a more 'traditional' system of farming, have more control over their decision-making process as regards harvesting times than do farmers in the other case study sites, many of whom are more driven by marketing considerations. We would require a qualitative study, coupled with a correctly structured quantitative survey of the characteristics of varieties, to be able to validate such a conclusion.

However, the data does illustrate the very great flexibility that farmers do have, if they cultivate agrobiodiversity in this crop. By *de facto* storing their crop in the *roça* until the ideal moment for harvesting they are able to take up the crop when it tastes best, cooks more easily, is deemed best for *farinha* or starch-making and has the highest market value. The farmers are also able to harvest when the family has sufficient labour available, when the climate is right and at the appropriate time in their own calendar of work (whether agricultural or other). These sorts of points, made to me by different informants, are included in the ethnobotanical tables in Appendix 1 for each of the documented varieties. Clearly, the fewer varieties that are cultivated by any one farmer, the more limited are his or her choices and the more the farmer's control over their whole Manioc Chain is weakened.

> 'Each producer knows his or her varieties depending on their very specific needs. The great survival of manioc is in its varieties. There is no model. Technology and mercantilism will not ensure the survival of manioc.' (Agronomist EBDA, Alagoinhas. Pers. comm. Nov. 2002)

CONCLUSION

In this chapter I have discussed genetic diversity and related issues in terms both of the studies of the manioc specialists and of my own empirical findings in the four case study sites. My record of manioc varieties extends the available inventory in the Amazon and, to my knowledge, provides the first comparable inventory for Bahia. In the analysis of these inventories we have established that a number of varieties in each site were 'remembered' and yet apparently not cultivated at the time of the fieldwork. I am suggesting that varietal loss in the living memory of local farmers (up to 85 years) could be more than 40 per cent of the known varieties in three of the four sites.

There is ample reason to believe that the growing of manioc by small farmers in north and north-east Brazil is subject to the same erosion of varietal diversity that has been widely identified as a global phenomenon. The prime cause of the erosion, for all food crops, is the substitution of a relatively few high-yield varieties for a previously much broader and more diverse range. Viewed globally, this process is going forward very rapidly.

> 'The 20th century witnessed unprecedented and accelerating advances in crop breeding techniques, and widespread adoption of improved crop varieties by farmers the world over… However, the pervasive use of scientifically bred varieties is displacing the use of farmer-developed varieties, giving rise to concerns about "genetic erosion" and a loss of agricultural biodiversity.' (Koo *et al.*, 2004:xvii)

Viewed from the ground, the reasons for the erosion of the hitherto rich genetic resource are complex, because farmers strategise in very different sets of circumstances and on differing assessments of their best course of action. [12] As we shall see in Chapter 8, the reasons for the erosion of genetic diversity in manioc, as and when this occurs, range from the economic – factors relating to both supply and demand – to the often-neglected field of culture, which includes the farmers' own knowledge and skills. The reasons for neglect by outsiders include disregard for farmers' own knowledge and the advocacy by agricultural scientists of the 'modernising' form of agriculture that so many of them favour, marked as this is by their emphasis on high-yield varieties. As Emperaire has pointed out, to understand erosion we also need to understand the phenomenon of neglect. This neglect is characterised by the persistent undervaluing of the genetic diversity created over the generations by the farmers, which is as much a cultural resource as it is a biological one.

In the following chapters, as I discuss the farmers' management strategies in some detail, the advantages for small-scale farmers of cultivating many varieties of manioc will become increasingly apparent. As will be seen, the field over which farmers and their families can strategise is quite wide - as wide as the Manioc Chain that is explained in Chapter 2. The

[12] Pottier gives an example from a traditional rice-growing area. 'The issue is how people use human agency in the face of change and uncertainty. Basically, when confronted with structured constraints and hardships, poor farmers do not resign themselves. This is well illustrated, for example, in farmer reaction to the high cost of 'improved' agriculture in Pampangan, the Philippino village where Banzon-Bautista (1989) researched. By the end of the 1980s, several peasant farmers who struggled financially (12% of the village) reconsidered the wisdom of a clean break with past farming practices. Closing ranks with those who had been sceptical about the hi-tech approach from the start, these farmers cut their chemical inputs and began combining modern with more traditional rice varieties.' (Bazon-Bautista, 1989:147 cited by Pottier, 1999:87)

field extends from the production of both crop and foods through to their distribution and exchange and on to final consumption.

CHAPTER 6

AGRI-CULTURE:
THE PRODUCTION OF THE MANIOC CROP

CHAPTER 6

AGRI-CULTURE: THE PRODUCTION OF THE MANIOC CROP [1]

INTRODUCTION

This is the first of three chapters which, taken as a whole, discuss the 'Manioc Chain'. The production of the crop, which is the first link in the chain, is essentially about agriculture and specifically about the manner in which family farmers manage their crop and introduce and manage change as they experiment and adapt to new needs and circumstances. The ways in which farmers take advantage of the different varieties of manioc, each one with its different characteristics and uses, is an integral feature of farmers' crop management. The greater the flexibility a farmer is able to exercise in controlling the various aspects of the crop cycle, the more likely it is that he or she will be using a number of manioc varieties and will have developed a reasonably robust system of crop and food production.

The chapter presents and appraises empirical evidence from the perspective of the small-scale family farmer in the *roça,* who always remains the subject of this study. Although there are differences in farmers' practice and attitudes between the four case study sites in Pará and Bahia - as well as climatic, ecological and socio-economic differences - there are still notable similarities in practice. Some aspects of the farmers' management of manioc might correspond with the practices of Amazonian indigenous peoples that are documented in specific ethnographies. However, I am not aware of any such case studies of manioc farming among 'non-indigenous' farmers either in Pará or in Bahia. [2] I am also unaware of any published studies of indigenous or other small-scale manioc farming in Bahia or other areas of north-east Brazil. [3]

In contrast to the farmer-centred approach that I have adopted in this study, the understanding of many agricultural specialists has been formed by work in research stations, by research publications and to some extent by macro studies of agriculture and rural development. These specialists usually have the best of intentions but their experience lies

[1] This chapter is based on interviews with a total of 59 farmers and on visits to most of their fields. It is also based on group discussions, family and other informal conversations and interviews with local extension agents and agricultural scientists.

[2] See Emperaire (2001) for literature review on this theme from Amazônia. Emperaire and Pinton's own short study among manioc-cultivating colonists in Altamira (Pa) is exceptional in this genre. (1999) (for discussion, see Chapter 5)

[3] I have made use of a doctoral thesis (Ximenes, 1985) and of one Master's dissertation (Santos, 2001) that are enlightening on one or other aspect of the relationship between small farmers and manioc.

outside the realm of small farmers, many of whom operate within an informal economy that is scarcely perceived, let alone understood, on the outside. However, agricultural specialists do wish to help the farmers to meet their needs as they, the agriculturists, understand them to be. The agronomists do this in two key ways: by improving yield and by preventing and eradicating pest infestation and diseases. Yet there is a gap in this conventional wisdom, which I address in the farmer-focused fieldwork of this study, undertaken as it has been quite literally in the fields. The findings suggest that those who value genetic diversity in agriculture should reappraise the customary rather dismissive attitude to agri-culture as practised by small farmers, especially as this concerns the ways in which they manage genetic diversity in manioc. [4]

THE CROP CYCLE

I have used the framework of the crop cycle to present this discussion (Figure 6 - 1). I have adopted this approach so as to enable an exploration of the rich, varied and complex practices of farmers at different moments of the cycle and to examine the ways in which they have adapted these practices over time to meet newly emerging requirements.

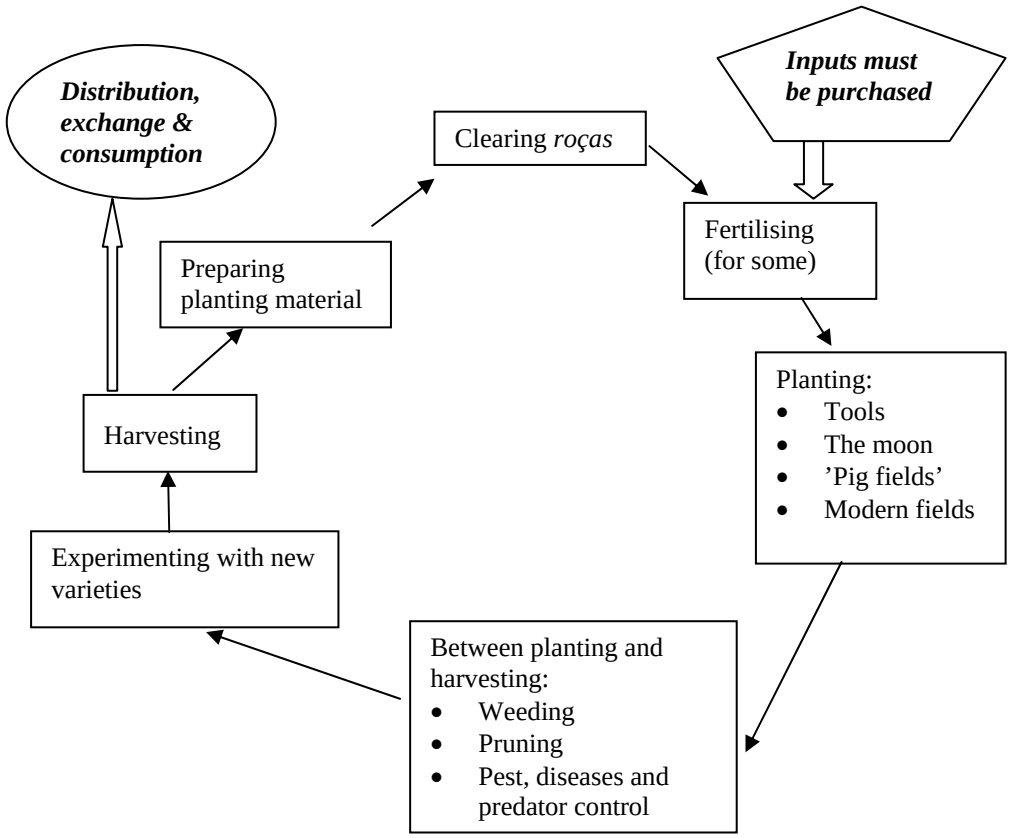
In analysing field observations and relevant background material on the broad theme of family agriculture, we discover variations of practice not only between sites but also within a single case-study site. Variations in practice and perception within a particular area may be explained by any one of, or by a combination of, a number of factors. These will include family structure and size, which impact on availability of labour, social class, relationship to the land [5], the availability of material and social capital and the aspirations of the family vis-à-vis the external market. As Brookfield notes:

> 'Not all farmers achieve high-quality management, and there is always heterogeneity in an agricultural landscape that may appear, at first sight, to be essentially homogenous in its practices.' (Brookfield, 2001:278)

[4] Virginia Nazarea encapsulates a key distinction between the contrasting aims of agricultural scientists and farmers, with regard to a different food crop, rice. '.. the tendency [is for] rice scientists to focus "on how rice grows", whereas rice farmers are more interested in "how to grow rice." ' (Nazarea, 1998:54)

[5] The farmers included in this study may be labourers with no land of their own or they may be share-croppers, or 'squatters' (*posseiros)* with no title. Others have title or legally rent or farm the land of others. For some, their land-tenure status remains legally unclarified.

Figure 6-1: The Crop Cycle



The significance of the various factors that underlie this heterogeneity and the different ways in which they shape the farmers' agricultural practices are explored in the analysis of the successive stages of the crop cycle. However, there is a further factor that is distinct from all of these. In each of the case-study sites I found not only social differentiation but also a difference in expertise. Always there were one or more expert manioc farmers. These people, men and women, occasionally had social status within their communities as well as a wider reputation for their knowledge and propensity to innovate. Others, such as the widow whose practices are cited in the section on clearing *roças* below, had no such status. Yet, in all cases, these were the farmers who had the greatest knowledge about genetic diversity in manioc and who cultivated many varieties. They are therefore of central importance in this study.

Virginia Nazarea, in her study of the cultivation of sweet potato varieties in the Philippines, writes of the same kind of strategising that is evident in the findings of my own Brazilian case studies:

> 'People retain a diversity of beliefs and practices, alternately hedging - following many, even at times conflicting, prescriptions to spread out the risks - and experimenting in an effort to find a match among varieties and technologies that work *most successfully most of the time.'* (Nazarea, 1998:60)

'Expert' farmers

The identification of such local experts coincides with the outcome of the work of Miguel Pinedo-Vasquez and his colleagues working in the Brazilian Amazon site of PLEC. These scientists identified a number of 'expert farmers' in their project areas in both Peru and Amapá in the Brazilian Amazon. The identification of these individuals was significant for two main reasons. First, it enabled PLEC to learn with and from farmers and, secondly, it provided the project with the cornerstone for their approach to the dissemination of 'conservationist production practices' through facilitating a 'farmers learning from expert farmers' methodology. This was because they found that the great majority of the *várzea* population with whom they were working 'learn by interacting among themselves'. PLEC counterposed this farmers' philosophy to a 'predominant philosophy guiding past and current extension programmes', which considers that 'farmers must be taught how to farm properly.' (Pinedo-Vasquez *et al*., 2003). This chapter about manioc agriculture likewise juxtaposes local expert farming practice, as well as local farming practice in general in all its diversity and unevenness, with the external idea of what constitutes 'proper' farming - as it is so frequently disseminated by extension agents and their colleagues. I do this so as to support a central argument, which is that livelihoods *and* genetic diversity alike are achieved through the farmers' own practices rather than through the application of any external idea.

Farmers and food-makers

By focusing in this study on a single food crop I am able to complement the vision and findings of the PLEC, which is more or less exclusively about resource management in agriculture. I do this by introducing an additional element – the expert food-maker – who is the expert in manioc processing. Most family farmers are still also food-makers although, as we shall see, in some cases where manioc farming has become more commercialised farmers tend their crop, which they then market. Others – even other families – are developing in parallel as *farinha*, *beijú* or *biscoito* makers. For these people farming and food production are becoming separated occupations.

As PLEC activities demonstrate, expert farmers play an important role, along with their neighbours and fellow farmers, in ensuring that local farming is robust in a changing, modernising environment. Yet these communities face challenges that farmers alone are powerless to resolve. For most of the family farmers in the case-study areas, manioc is their life. There were farmers in each one of the case-study sites who made this point very explicitly during interviews and informal conversation. It is the single most significant crop that they cultivate, simply because it is the mainstay of the diet of most people who live in these areas.

The reason for distinguishing between the crop and the foods relates to an issue that arises within the context of this and the following two chapters, all three of which analyse the Manioc Chain.

Between them, the expert family farmers and the expert *farinha*, *beijú* or *biscoito* makers are part of a huge community of Brazilians who together ensure not only their own food security but also that of hundreds of thousands of others by providing a cheap, locally produced staple food. As is made clear both in this and in the following chapter, family farmers themselves do not see any hard and fast distinction between crop and food production. We shall return to this point in the concluding chapter of the study both in reflecting on agricultural development policy and in considering issues for further research.

Through examining manioc farmers' strategies throughout the duration of the crop cycle it becomes evident that the manner in which most of them who are exposed to market and other pressures are opting to face the challenges militates against the maintenance of a broad genetic resource base in manioc. Farmers are constantly faced with pressure on land and changing, sometimes aggressive, market pressures in their capacities as consumers as well as producers. Other factors, such as shortages of family labour due to migration, smaller family sizes and children in primary and sometimes secondary education, also require farmers to adapt their practices. Finally, the growing accentuation of economic and social stratification in the countryside, that is most evident in Bahia, can frequently mean that small farmers become the victims of modernization since they can no longer compete even in the local market place. Their previous subsistence strategies in agriculture are no longer viable, with potentially major implications for agrobiodiversity.

External and internal economic forces are not the only ones that impact upon farmers' agricultural and food security strategies. The anthropologist Thomas Eriksen explains this way of thinking:

> '…economic anthropology distinguishes itself in important ways from the economic sciences. Anthropologists have always - at least since Malinowski - wished to call attention to the ways in which the economy is an integrated part of a social and cultural totality, and to reveal that economic systems and actions can only be fully understood if we look into their interrelationships with other aspects of culture and society.' (Eriksen, 2001:176)

An aspect of the culture of small-scale farmers has and continues to be the manipulation of many varieties of manioc for reasons that range from ensuring soil quality, minimising disease and pest infestations, producing products to satisfy different tastes and different needs to valuing some varieties simply because they are considered to be 'pretty' or, for whatever reason, unusual. The manioc farmers included in this study were not simply acting as *homo economicus*, as referred to in Chapter 2, or even as the 'rational agents' to whom Marshall Sahlins (1972) refers in his study of the cultural rationale within economic systems.

The challenge raised by this study is to consider both the value and the practicalities of maintaining a strong genetic resource base in manioc within a modern system of family farming, in terms of both its cultural and the economic aspects. This chapter is about some of the cultural aspects of various systems of family farming which I call 'agri-culture'. I conclude by examining some options as to how this kind of farming might be sustained in such a way as to satisfy local cultural and economic aspirations.

A note on quantitative measurements

The narrative of outsiders such as state and federal planners, agronomists and extension agents is frequently presented statistically. For example - and most commonly - the measurement given is of tons of root-yield per hectare. This quantitative mode of analysis obscures and thereby undervalues farmers' own very different perceptions and practices.

Unlike the outsiders, family farmers in the interior of the Amazon and the North East of Brazil are very approximate with their quantitative information when they do offer any, whether this is about the size of their fields or land holdings or about the amount of manioc that they grow or the *farinha* that they make. The hectare is almost never used by farmers as a unit of measurement for an area of land. In the Pará case study areas, the terms '*tarefa*' or '*lote'* were used. In SW Bahia the square measurements of land used were *alquer* and *prato* while various old linear measurements such as *braça* and *palma* were also used. [6] Some sort of quantitative measurements for *farinha* are required for trading purposes, but these

[6] Tarefa – (Pará) probably between 3-4 square metres. (Bahia) = 30 square *braças.* (1 *braça* = 2.2m.)
Lote – in Capim is 25 has., the area of land officially deemed sufficient for a family farm to be viable.
Alquer – Popular definitions varied between 12 and 20 hectares.
Prata – One farmer informed me that this is 28x30 braças. A braça = 10 *palmas.*

measurements - whether they be by the litre, the kilo, the can or the sack - are rarely standardised or monitored and as a result farmers are frequently short-changed.

Both Oliveira (1991) and Pereira and McGrath (2001) comment on the virtual absence, in the Amazon, of a quantitative frame of reference in the farmers' perceptions. Bahian farmers are very similar in this respect.

Determining planting strategies and clearing land for the new *roças*

In Bacá, where agricultural practices are more akin to pre-colonial indigenous practices, the clearing and preparation of *roça*s for a new crop involved a farmer in making strategic decisions. There was less pressure on the land than in other places, allowing farmers more scope to decide which area of land and how much of it to clear. They did this when the land in question had been lying fallow, perhaps for decades. It is a labour-intensive process. The labour so employed obviously could not be utilised in other ways: a decision to clear an area of forest had opportunity costs. In contrast, farmers in Alagoinhas, for example, were not faced with having to make such a choice nor did the preparation of a *roça* require a strategic decision. As compared to Bacá, human population density today is very much greater and land tenure or land occupation is very much more restricted among small farmers in this region. Where land can be left fallow for a year or two, vegetation growth is not very great. So, compared to the situation in the Amazon, the labour required to clear a plot is quite limited even if a tractor and other machinery are not being used. Farmers in the Pará case study sites, in particular in Bacá, had much more control over the decision to clear or not to clear a plot of land as well as over the manner in which this work would be handled and its timing. This is one of the spheres of farmers' work where their control diminished in direct proportion to the family's proximity both to large towns and cities and to large ranches and agricultural estates and plantations. Thus a farmer's ability to strategize had significantly diminished since the mid-twentieth century in the Bahian case study sites and, to a lesser extent, in Capim.

Within the existing patterns of land use farmers were still making significant choices. For example, in Gurupá and Capim farmers decided before starting out whether to open up new fields in the forest to create 'virgin' *roças (roçado de mata))*[7], or to clear a plot of *capoeirão*

[7] Although several scholars have demonstrated that there is no longer any 'virgin' forest in the Amazon (Raffles, 2002, for example, argues this forcefully), this term *'roça de mata'* was used by a farmer from Bacá who distinguished this type of land from fallow land (*capoeira* or *capoeirão*) and primary and secondary fallow (*capoeira primária* and *secundária).*

(or *capoeira primária*) which had not been used in the last 15-20 years or to clear a *capoeira* (or *capeoira secundária*) which had been used within the last five years.

Depending on which choice the farmers make, there would be differences in the quality of the crops. This was explained to me by an 'expert' farmer in Bacá who offered me a tutorial on the basis of knowledge that he gave me to understand was widely shared. He explained that virgin *roças* and *capoeirão* produce rounder, fatter, larger roots in the first planting and that this fact is widely understood in the region. Although the plants are slower to mature the harvest is good. According to another farmer, one of the varieties, *Folha Estreita*, which was fairly widely cultivated was particularly productive in the *roça de mata.* Manioc in the *roça de capoeira* matured faster. Peter Furley (1980) observes that the first planting of crops in newly cleared forest land is unusually productive due to the high level of organic matter in the soil.

There was simply not enough land remaining for farmers to cultivate so there were far fewer 'virgin' *roças* in Pará and no unoccupied land in the case study sites in Bahia. Where land could not be left fallow, crop rotation could still be used to preserve soil quality. The customary definition of crop rotation refers to a system in which a number of different crops under cultivation by a particular farmer are planted in different fields, or parts of a field, in different years or cycles. This practice was uncommon in my case study sites and was observed only in two places: in Belarzinha in Capim, with the crop rotation being mainly between beans, maize and manioc; and in a very few farms near to Conquista in SW Bahia. Farmers tended not to plant other crops in manioc fields - but I learned that at least in one case manioc varieties were rotated for exactly the same reasons as other crop varieties are rotated. One very land and labour-poor woman farmer, an elderly widow who lived in the community of Catita in Capim, seemed to have found a solution to the danger of land impoverishment that occurs when land is used continuously for a number of consecutive years. One of the ways in which she managed poor soils was to use the varietal diversity of manioc that she understands so well:

> 'When the soil is poor, I plant *Cearense*. Then I keep changing the manioc varieties. …One year I plant *Brugesa, Zulinda* and *Jurará*. The next time I plant *Táxi Vovó* and *6 meses* - then *Cearense, Tapuia and Mirití*.'

This is an example of an adaptive response to constraints and difficulties by an expert farmer who, as in this case, used her knowledge of genetic diversity in manioc to maintain a healthy crop.

Although it was rare to find other crops planted in a *roça* that had been allocated for manioc, it was not so unusual in any of the case study sites to find manioc (sweet or bitter) growing in *roças* that were being used principally for a cash crop. For example, one farmer in Catita, Capim, who had chosen to plant black pepper in one of his *roças*, grew some manioc in the spaces between his pepper plants, despite contrary advice from an agricultural extension agent. The farmer explained to me that he did not want to 'waste' this space, in particular because pepper takes a few years to establish before it becomes productive. In the farmers' perception the land was not productive until he could harvest and sell his pepper.

Another rather interesting example of this type of practice was found in SW Bahia. A significant cash crop in much of Brazil is the shrub, *urucum (Bixa orellana),* the seed pods of which had a good price on the market during the time of my fieldwork. It is used as a red food dye. [8] In a farm in SW Bahia, near to Conquista, the farmer had planted a number of very late varieties of manioc throughout his *urucum* field. This manioc was for domestic use only because there was little of it, but the farmer was pleased to tell me that he planted it at the same time as the *urucum*. He knew that the aerial part of the manioc would develop more quickly than the *urucum* and thus would not be overshadowed by the leafy bushes as they developed. In this farmer's view it was quite rational to utilize his land with late manioc varieties while his cash crop was growing up. He clearly took great pleasure in pulling up a few maniocs, all of which were 3-5 year varieties and none of which he had planted in his main field, just to show them off to me, the outside researcher.

In the two Pará case study sites land was cleared manually and then burnt. The time of my visit to Bacá in May, just after the rainy season, was also a time when some new *roças* were being opened. New *roças* are planted later, towards the end of the year, normally in November and December. I was able to witness some heavy clearing of low forest to make new clearings for what eventually would become *roças*. In Bacá as in Capim it was still customary to clear the fields manually of all the smaller vegetation and timber, sometimes with the use of a chain saw, and then to set fire to them to clear them thoroughly. The manner of clearing and burning these areas was precise and was not predatory on forest vegetation. Only the areas of forest necessary for the establishment of small new *roças* were being cleared and eventually would be burned. This type of clearing of the forest vegetation by experienced native farmers respects the forest as a vital resource. Farmers are also extractivists and thus need all the diverse resources of the forest to guarantee their livelihoods. A recent detailed study of this process, albeit in the Amazon floodplain in the

[8] *Urucum* is also widely known as a dye used by many indigenous peoples in body paint.

state of Amapá, amply demonstrates this point about careful and wise resource management. (Pinedo-Vasquez *et al*., 2003)

Much has been written about Amazonian deforestation and, although in some cases the media is still quick to blame small farmers, in no way can this type of slash and burn activity by settled communities contribute to the problem. The burning of the *roças* in the typically phosphorus (P) deficient Amazon soils can increase the phosphorus in the soils and thus be generally beneficial to agriculture. Brookfield helpfully describes what fire does to the soil (2001:125-7) and notes that 'This change [increase of P] more readily permits the taking up of a number of nutrient ions by plants and lowers the ability of toxic elements to damage plant growth'. Hecht and Cockburn (1990) compare and contrast the practices of small-scale farmers and indigenous peoples in Amazônia to the practices of those who clear huge areas of the forest for economic or speculative gain. Within the wider literature about the destruction of the Amazon rainforest, the process of slash and burn agriculture has been described and the impact on the local and wider environment much studied and analysed from many perspectives. Soil scientists, specialists in forest management and biodiversity conservation, political and economic historians and other writers, as well as film-makers, are among those who have studied this phenomenon. (e.g., Fearnside (1985), Furley (1990), Goodman and Hall (eds.) (1990), Hecht and Cockburn (1990), Cowell (1990)). Today, large-scale and destructive forest clearance continues to be carried out in much the same way by predatory loggers and timber merchants, cattle speculators and industrial scale soya farmers in the West.

In Bahia, although the soils, climate and ecology are quite different, the clearing and preparation of fields for planting in the past was not so very different from contemporary practices in the Amazon. Farmers used fire to clear their fields and the rest of the work was carried out manually. However, there have been considerable changes in the ways in which land is cleared in Bahia over the past three or more decades.

Today, most farmers in the Bahia case study sites clear their fields by tractor, a practice which can cause soil compaction. Where fertilizers are used - and especially when they are incorrectly used - further damage is done to fragile soils (see the discussion in the following section). Sometimes fields are burnt before the tractor is brought to the field. Tractors can be hired and are usually available to small farmers through their Farmers' Associations. One young woman farmer in Formoso near Inhambupe told me about the calculation:

> 'The tractor costs $R30 per hour. It takes 20 men one day to clear my field and I would have to pay them R$8 per day - so it is much cheaper to use the tractor.'

The arithmetic is compelling. It is also a reminder of how rural society is becoming more divided. The labourer who earned $R8 per day probably no longer had any land and, even if he or she did, would have to clear it manually since it would be hard to pay for the tractor hire. Ultimately the result was to risk impoverishing the already poor soils of this area - although I heard only a single local agronomist remark on this adverse consequence of using tractors. His remarks related in particular to the *tabuleiros*, the flat sandy lands in the Municipality of Alagoinhas. He explained that in this area, although the top 15 cms. of the ground remains good, the soil up to 40cms. below that becomes compacted. This then inhibits the drainage qualities of the soil that are essential for manioc production and without which *podridão* or root rot can occur. (Pers. comm. EBDA Alagoinhas).

Farmers' different practices and strategies all carry their own specific logic. In the end, some practices might be more successful – according to the farmers' own logic – than others. The objective of this study is not to judge but rather to observe and analyse the manner in which farmers respond to change. We shall see, as we move on through the crop cycle that every activity is affected to a greater or lesser extent by pressure on land and by modernising influences.

Fertilizers and the modernising of agriculture

Two issues are highlighted by the research. The first is the differential use of chemical fertilizers between the four different case-study areas and the reasons why Alagoinhas stands out from the other three. The second issue concerns the differential advantages from the use of fertilizers that accrue to large and small-scale farmers within the *Agreste* of Alagoinhas and some neighbouring municipalities.

The differential use of fertilizers in the four case study areas is remarkable. Chemical fertilizers were not used for manioc in Bacá and were only used exceptionally and only by one of the farmers whom I met in Capim - a farmer who grew manioc intercropped with other crops. In Capim, most family farmers could not afford fertilisers - or would not see any point in using them for manioc, even if they were heavily subsidised and promoted by rural extension services. Where fertilisers were used, as in the case referred to below in the section on modern fields in Belarzinha, Capim, farmers customarily received some technical

guidance on their application. [9] The few farmers who did use fertilizers in Cândido Sales, SW Bahia were farming commercially.

The Alagoinhas *Agreste* region stands in total contrast to the Pará case studies since all but the poorest farmers visited in this area used fertilizers, this change having come about over the last 10-15 years. The reasons for this development relate, in part, to soil degradation that can best be corrected by the application of phosphate fertilizers but it is very probable that the extension service, EBDA, promoted the use of fertilizers with small farmers among the other new farming practices that were introduced.

EBDA has been active for thirty or more years in this region and the present highly experienced technical team were recruited as far back as 1984. Since that time there have been radical cut-backs in the rural extension service. Yet the impact of this service on manioc farmers in the area has been wide-ranging. This is mainly because the Alagoinhas office of EBDA was an important point of reference for a 10-year international 'participative research' project into manioc that involved 40 rural communities in the area. It concluded in the late 1990s. One of the impacts was the increased use of fertilizers with a consequent increase in yields for *some* farmers. A senior EMBRAPA scientist involved in this international project informed me that:

> '…the predominant soils in this area are reddish-yellow latosols which nearly everywhere in the area are deficient in phosphorus. Using phosphate fertilizers produces good results whereas production levels without the use of fertilizers are almost nil.' (Cerqueira, pers. comm., 2002)

The recommended amount of natural phosphate cost R$72 per hectare at the time of my visit. [10] As the official minimum wage at that time was R$200 per month, and since most farming families survived on less than this, many of them found this too expensive. Although the effects of other chemical fertilizers on yield were small, this same scientist believed that organic fertilizers were 'very important' for the improved production both of manioc roots and of the arial part of the plant.

While there is no dispute about the value of using organic fertilizers and caring for the soil by using organic matter in the *roças*, the scientist's claim that without fertilizers 'production levels are almost nil' does merit discussion. Farmers in the *Agreste* of Alagoinhas have

[9] I did not investigate why farmers did not use fertilizers in Pará. This is because I undertook the Pará case studies before moving on to Bahia and only had reason to reflect on the use of fertilizers with manioc towards the end of fieldwork. The Bacá practices referred to suggest that farmers were using their understanding of fallow management to ensure good soil quality.

[10] $R72 = approx. £16 in December 2002. The recommended application was 400kgs./ha. according to an EBDA agronomist.

always cultivated manioc, at least in living memory, even though until about 15-20 years ago the crop was mainly grown only for subsistence use and otherwise to supply very local markets.

At the time of my visit agronomists were considering whether to conduct trials to test the efficacy of the organic fertilizer or soil-improver, MB4, which is applied 3-4 months after planting. Whatever the results of these trials may have been, this will be another product that will need to be purchased by farmers should it prove to be effective. Yet there is a locally available material which costs the manioc farmer nothing. One of the most easily available organic fertilizers consists of two of the waste products of manioc itself, *manipuera* that locally is called *água de mandioca* (the waste liquid produced in the production of *farinha*), and manioc peelings, that likewise are produced in the *casa de farinha*. This effluent is rich in both phosphoros and nitrogen (see Table 7-3, Chapter 7). A female farmer in Formoso near Inhambupe would not use chemical fertilizer because, as she said, this meant that the flavour of the starch was not as good. [11] She used the peelings and leaves of manioc and animal manure. Another farmer in this area made the small capital investment that was required to build a tank in which to collect the *água de mandioca*. This waste product had to be left to rest for at least one week to release some of the toxic hydrocyanic acid. It could then be loaded into small barrels, and transported by a small vehicle to be applied to the manioc fields. This same farmer/*farinha maker* sometimes sold this product - and manioc peelings - to other local farmers. Another local source of organic fertilizer, according to the specialist Conçeição, consists of aggregates made from the castor oil plant, which is common in Bahia, and bone meal or other simple superphosphates. This must be applied to the ground 20 days before planting. (Conçeição, 1981:133).

I met about half a dozen farmers in Alagoinhas and SW Bahia who were using *água de mandioca* as a fertilizer. However, given the difficulty of applying it to a large area of land, people tended to use it for vegetables as well as for manioc in small plots of land around the *casa de farinha*. Likewise the peelings, which are a good source of compost, were usually only applied in the immediate vicinity.

Even more interesting than the differences of practice in the use of fertilizers between case study sites was the variation in practice between families in the *Agreste* of Alagoinhas, which was the only area where fertilizers were systematically applied. The differences, to

[11] *Beijú* makers in Ponto de Beijú and Catuzinho near Alagoinhas sometimes are obliged to purchase starch imported from Paraná where chemical fertilizers are used. They reported that neither they nor their customers like the taste of this product. (Pers. comm. EBDA Alagoinhas)

some extent but not exclusively, were an indication of social stratification. The poorer farmers tended to be those who either used fertilizers incorrectly or who did not use them at all. Among those who used fertilizers correctly there were still a few farmers, although unfortunately only a minority, who recognised that the maintenance of agrobiodiversity in manioc and of agrodiversity in general ensures a robust, sustainable rural livelihood. One young farmer in Inhambupe who comes of a family of expert farmers and *farinha*-makers who make extensive use of organic fertilizer recalled:

> 'Before, there was a greater diversification of crops but they did not need fertilizer. There was tobacco, oranges, dry rice, more varieties of beans and some cattle.'

There is no doubt that a small number of farmers in this area, in particular in the municipality of Crisópolis to the north of Alagoinhas, had become successful producers of large quantities of manioc. Their practices were 'modern' and the yields were high by any standards and especially for Bahia (16t/ha). [12] This has been one of the phenomena of the modernisation of Bahian agriculture. A very few farmers began to concentrate production, in this case of manioc, in a few large farms. These farmers were cultivating one or two high yield varieties only and were using intensive farming techniques. The down-side of these success stories was that many smaller farmers had simply been driven out of the market place. Young people from farming families were being faced with the decision as to whether it was sustainable to continue to run small, under-capitalised family farms – and if so how - or whether it would be better simply to sell their land and find other types of work. The young man cited above lamented that 'in the semi-arid lands, family agriculture does not exist - the young people leave'. Fortunately, he exaggerated slightly. His own family was an example of those expert farmers who can and do continue to work in an agricultural environment that is dominated by quasi monoculture. Not only did they cultivate a total of 7 varieties of manioc and *aipim* which they used to make *farinha* and *beijú* but they used the waste products of their *casas de farinha* to improve their manioc and other crops. In the following chapter, which is on the production of food, I will further explore other ways in which the more expert and genetically diverse type of agriculture can remain robust.

The system of family agriculture whereby the family cultivated many crops as well as fruit trees and small animals and poultry has changed totally within the living memory of the families in the case study areas in Bahia and in Capim (in Bacá farmers are extractivists so this does not apply to them). In this type of mixed family agriculture, as practised in the past, soil fertility could be relatively easily maintained. It is probable, although to my knowledge not proven, that the rotation of manioc varieties in a *roça* might help maintain

[12] See Appendices 2F and 2G which shows comparative yields. NB. 16 tons = 16.256kgs.

soil quality. Also mulches and organic fertilizers might resolve some of the problems of farmers. Yet it is clear that the challenge to farmers is greater today than in the past.

Planting

> 'I started to work in the fields aged 10 with my mother. She told us to prepare the fields, to set fire to them - and she carried [loads]…then we cut a palm-sized cutting of manioc - and she would dig the hole and I would come behind her to plant. Yes, I planted and would cover the cutting - I planted - until midday when we went to lunch and then we returned to plant cuttings. She would dig here and there and I would plant cuttings…Now we just place the cutting on the surface and use a foot to cover it. Yes!' (Elderly woman farmer, Capim)

As planting was still being carried out manually in all four case study sites and in most of the north and north-east of Brazil few significant details – although many small details [13] – of the practice have changed in living memory. Yet the variations in practice between one community and another were part of the interesting culture of each place, passed down from one generation to another. [14] However, the organisation of labour for planting had changed. Where the market was the main motivation for farming, agricultural work was increasingly becoming a male occupation rather than a family occupation and more paid labourers were being hired. The learning and teaching process between older and younger generations was therefore beginning to break down in these cases.

For example, the planting of the cuttings remained mainly work for women and children in both the Pará case study sites and in all of the smaller, less commercially oriented farms in Bahia. In Inhambupe near Alagoinhas I watched on occasions while men and women worked together in the *roça*. While one or more men created small mounds with their long-handled, large headed hoes – *enxadas* – the women, carrying a plastic basin full of cuttings, would throw the contents into the hole created. Then, later, a man would come by to roughly cover the cutting with the earth from the mound, using his *enxada* again. The work was highly sociable and carried out very fast amid plenty of laughter and joking. However, this sociability was not to be found any more when the work was carried out by paid labourers or even when male members of the family owning the *roça* were working too. The gender balance changed whenever farmers had opted to specialise in the cultivation of manioc and to sell the fresh roots rather than using all or some of the crop to make *farinha* or starch. Most of the agricultural work, including planting, had begun to become work only for men and was no longer work for the whole family or - in the case of planting - for the women.

[13] Small details that have changed in some areas include: from breaking to cutting the stems, from using a basket for the cuttings to using a plastic basin, from planting in a hole or mound to planting roughly on the soil surface with a thin cover of earth.
[14] In Paraná (industrial scale plantations), planting is now carried out by a machine.

Whereas, as we have seen above, tractors were now being widely used for clearing and preparing the *roça* in the two Bahian case study sites, the techniques and tools used in the fields in all four case study sites otherwise had remained very simple. The *enxada* and the machete, or long bladed knife, were widely used for clearing fields, planting and weeding. These were tools used by both men and women. In Capim the *enxada* was first brought into the area about 30 years ago, probably by north-easterners. Some of the older farmers, those who thought of themselves as native '*Paraenses*', remembered the time when as children and young people they would dig the holes with a digging stick and weed with various sizes of machete. However, neither north-easterners living in Pará nor farmers in Bahia had any memory of having used a digging stick. Now they would use the *enxada*, the steel head of which must be purchased and which lasted for about two years of heavy use. Various sizes and shapes of steel heads were sold, each one designed for a different task. This detail is another example of the innovative influence of the north-easterners on agricultural practice. Their contribution to *farinha*-making technology in Pará is discussed in Chapter 7.

The table below sets out the main planting seasons for the four case study sites. Farmers planted their main crop at the time when they knew that optimal conditions were most likely. The second planting season, where it happened, was more problematic. This was related to patterns of rainfall as well as to the prevalence of pests and diseases in different seasons. Note that in Bacá manioc was planted once a year only.

Table 6-1: Planting times for manioc in the four case-study sites

Case study	Main planting	Second planting
Bacá	November/December	-
Capim	January	July/August
Quaraçú	August	December
Alagoinhas	April	November/December

The timing of the rain was a critical point in farmers' planting decisions. In Bahia, where rainfall is very much lower than in Pará, farmers waited for the first showers of winter before planting in the slightly damp soil. They hoped for more rain within a few weeks of planting so that the cuttings would be able to develop. In Pará, where rainfall is torrential in winter, farmers avoided the wettest seasons for planting. Capim farmers planted in January and

again in summer, in July and August. The January *roça* was least problematic while more difficulties were reported with the summer *roça*. [15]

A certain amount of anecdotal evidence gleaned from interviews with older farmers in Capim and the Bahia case study sites indicated that in the old days there was a single main planting time in the year. This was in the times before *farinha* and other products were marketed beyond very localised markets and when most small farmers provided almost exclusively for their families' subsistence. After this main planting time manioc might be planted at other times in the year, but possibly not in large quantities. One elderly lady in Capim explained that when she was a girl (possibly in the mid 1940s), and long before the roads came in to Capim, they planted in May, June and July. Yet today, she explained, the soils were so poor that you must wait until summer. '*Mudou todo'* - 'everything has changed', she said. This observation arises from post hoc analysis of interviews and could be interesting to test on subsequent visits to the areas to see if land was being degraded in any way or whether this practice was one of the reasons why less and less land was being allowed to lie fallow. It seems that the land was being used more intensively for manioc in the areas where it was planted twice a year, driven by the desire to supply the market.

I found that ways of planting varied considerably between communities within the different study areas. In some cases there seemed to be good reason to believe that the manner of planting influenced the likely success of the plant. For example, farmers in both Pará and Bahia have planted two cuttings in a single hole in the ground for many generations - especially, as a man in Bacá explained, when the 'summer is hard' (i.e., hot and dry) and when the cutting is therefore more vulnerable. In Alagoinhas just one cutting went into the hole in the November/December *roça,* and this for two reasons: first, because farmers were confident that the cutting would take; and, secondly, because planting material was more scarce. Most interestingly, one particular variety in Capim, *Jabotí*, was planted just the one cutting to the hole whereas two were used for other varieties. This demonstrated how the farmers' knowledge of the management of a number of different varieties was put into practice. Another example of rationally explainable practice was found in Capim. In this case, instead of planting two cuttings, the farmer planted one longer one. The farmer told me that she planted longer cuttings for the summer *roça* because this was the more problematic of her two plantings. The shoots that would form the new leaves grew from points just

[15] 'The summer *roça* is a technological innovation that was introduced in the Bragantina region with a view to overcoming problems of poor soil fertility' Figueiredo, 2000:13 (my translation) Figueiredo is a senior agronomist in the Faculty of Agriculture at the Federal University of Pará, is my only source for this interesting information.

above and just below the leaf scars. The longer the cutting, the more new shoots there would be.

In contrast, there were other planting practices for which I was unable to obtain an explanation. For example, sometimes the cutting was placed parallel with the ground, sometimes it stuck out of the earth like a chocolate bar in an ice cream. One man, who was originally from Alagoas State, told me that in Quaraçú where he was now working he followed local custom and planted one cutting leaning westwards and the other eastwards. In Alagoas, he told me, he used to plant in the same way but the cuttings would be planted north-south. It is possible that this practice might have been determined by the direction of the prevailing winds, although this farmer did not mention this. [16] This same farmer said that whereas in Alagoas he had cut the cutting from the stem at an angle, in Quaraçú he followed local practice and made the cut at right angles. For him the fact that this was the advice given by agronomists did not signify, since he did not acknowledge their views as being the source of his own changed custom. The EMBRAPA agronomist Souza has argued that the cut at right angles results in a greater number of evenly sized roots whereas a stem cut at an angle only produces roots from the longer extremity of the cut. (Souza in EMBRAPA, 2000: 23-24). However, this guidance does not take into consideration *either* the angle of planting or other details of planting (depth of planting, whether in a mound or a hole, spacing, intercropping, *or* the variety of manioc where the frequency of leaf scars per stem differs). As many professional authors recognise, this varies considerably according, among other factors, to soil fertility, weather conditions and reason for planting.

A farmer in Capim explained to me that he built a little mound into which he planted his cuttings almost vertically - and when it began to sprout he would go through the field and flatten the mounds. Others planted in long mounds called *camaleão*. Two farmers, one in Capim and another in Inhambupe, told me that you need to plant cuttings in a deep hole when it is not raining.

Farmers also had different views on the optimum length of the cutting used for planting. Although cuttings tend to be 10-15cms., they could be longer, up to 50 cms. The length of the cutting tends to depend on the ratio of 'storeys' to the stem (defined as the distance between the leaf scars) which varies widely between varieties. (Rogers and Fleming,

[16] 'The reason the Kuikuru give for slanting the cuttings toward the west is that as the young plants are just coming up, these winds blow with great force and could more easily damage the plants if they were facing into it. Soon, though, as they grow taller, the plants assume an upright position.' Carneiro (1983:80)

1973:6). According to my direct observations this detail varies, sometimes very greatly, between varieties. Some technicians, in some environments, argue that the yield is higher if you plant 20 cm. cuttings yet I did not meet a single farmer who chose to discuss the connection between cutting length and yield. The farmers were only concerned with planting a cutting that would grow.

I argue that the micro variations in cultural practice are likely to have a rational explanation, given the multiple variants of any given micro region or *roça*. Given not only the diversity of the farmers' practices but also the varietal diversity of manioc as cultivated in so many micro-climates and small places, the tendency of the professional agronomist to provide universal guidance is highly questionable and, indeed, would need to be adjusted at the level of each *roça*. This same warning applies as we continue through the processes of the crop cycle. We need to be alert to the importance of the role of the 'expert' farmer in his or her cultural and geographic environment.

The moon

From time immemorial the cycles of the moon have determined the rhythms adopted by man in the planning of many of life's activities. Agriculture, the source of much of our food, is one of those activities that farmers have often thought is governed by the moon's phases. [17] Sometimes spiritual or mythological reasons lie behind this affinity with the earth's own cycle.

The great majority of farmers in all four of my case study areas told me that they planted only in the period of the first quarter of the waxing moon. When asked for the reasons behind this practice their answers never drew upon mythology but were always pragmatic, often delivered with a smile which demonstrated the speaker's awareness that this practice was not based on principles necessarily endorsed in the outside world, but rather on what outsiders might well label as 'superstition'. There was a range of this kind of explanation. For example, one man told me 'I don't believe in all that. But it works!' Another, one of the wisest farmers in Bacá, was very precise and serious as he explained: 'I plant in the waxing quarter of the full moon. After the new moon - two days after - I plant and this ensures good roots. This is the way to do it. The root grows with the moon'. A farmer in Capim had a different view. He told me that he did not believe that anyone really understood the

[17] Virginia Nazarea reports on cultivation practices followed by sweet potato farmers in the Philippines who have various beliefs associated with the moon, e.g., that planting should take place during the daytime 'so that, like the moon, the roots will be seen anytime, anywhere' or 'plant during the start of the lunar cycle at the break of dawn in order to have a good harvest.' (Nazarea, 1998: Appendix A)

influence of the moon, but affirmed that during the first quarter of the moon's phase, it rained every three days. This would certainly be beneficial for the growth of the newly planted cuttings. From the most 'modern' to the most 'traditional' farmers in the case study sites all alike shared a common view about the significance of the phases of the moon in manioc agriculture.

I was keen to include an agronomist in a discussion about this practice and once was able to do so in a field in SW Bahia when I was accompanied by an academic agronomist. The farmer whom we were visiting was talking about the significance of the moon for him, and so I asked the agronomist for his opinion. His thoughtful answer was not typical of scientific specialists in agriculture. 'Well', he said, 'how can we tell? We do know that the full moon affects the behaviour of both animals and humans and we know that the moon affects the oceans' tides'. His remarks were interpreted as a vote of confidence by the farmer who then began to share with us some of the extraordinary 'folk' ways in which he protects his fields from snakes and crops from pest attacks and disease.

'Pig' fields

All farmers who have not totally accepted the schooling of extension agents, which is the great majority of those whom I visited, planted their fields at random, not in rows, to the fury and frustration of the technical people. A farmer in Bacá told me that such a field is called *roça de pourco* - pig-field. [18] In both Pará and Bahia maybe ten or a dozen plants of a single variety would be loosely grouped together - and so the field would be an apparently chaotic patchwork of varieties in those *roças* where many different varieties were being cultivated. On every single visit the farmers could immediately take me to where different varieties were being cultivated, so the field only appeared chaotic to the outsider. To the farmers every square metre of the *roça* was familiar.

The experimental varieties, which frequently were those few that the farmer was watching closely and that he had not yet named, were always kept at the edge of the field. In Bacá and Capim, where the bitter varieties were most valued for *farinha* and starch-making, *macaxeira* (sweet) varieties were always planted separately from the main *roça* – sometimes a little apart, to one side, or sometimes in a separate field. This area of the *roça* was where a woman could pull up just a few roots when she needed some 'fast-food' for a meal, in contrast to the rest of the *roça* where the manioc must be processed. However, in SW Bahia 'sweet' varieties, some of which were among the most widely cultivated, tended to be grown

[18] The term, 'pig fields' was used by one farmer only. This was in Bacá. The use of this term here does not suggest that it is generic.

mixed in the *roça* with other varieties with differing degrees of toxicity. In the small villages and hamlets that I visited in Bahia, as well as the towns of Gurupá and Capim in Pará, sweet varieties were tended by women in the home gardens or back yards around their homes. Women discussed varieties among themselves and knew which varieties their neighbours were growing, especially if one of them was particularly interesting or displayed unusual morphological features or culinary properties.

Small-scale farmers, including most expert farmers, in all four of the case study sites who were not exclusively farming for the market, saw little reason to change their planting habits and plant 'modern' fields, in rows as this meant adopting a different approach to agriculture altogether.

Modern fields

All agronomists agree that manioc should be planted in regimented rows with given amounts of space between plants, whether it is inter-cropped with annual crops such as beans, maize or even a cash crop such as black pepper or pineapples or whether it is planted on its own. The recommended spacing between plants varies according to criteria such as soil fertility and the main purpose of production (leaves or roots) and, in areas where mechanisation is used, the size of machinery. [19] The agronomists use a range of arguments to try and convince the family farmers of the presumed advantages of this mode of planting. These include:

- Weeding is easier and less labour-intensive.
- It is easier to estimate the total yield of any one field.
- It is easier to monitor the performance of individual varieties.
- By paying careful attention to the spacing between plants, you can maximise yield of roots (or of leaves for animals).
- It is easier to inspect the crop for infestation by pests and diseases and to treat and control these problems.
- Inter-cropping is easier, less labour intensive

Of the text books which provide a frame of reference for most agronomists, the earlier ones (e.g., Albuquerque, 1969) recognised that the needs of family farmers were different from those of industrial-size plantations. However, this sensitivity was no longer present in the discussion about spacing in Conçeiçao (1981) and was even less so in EMBRAPA's handbook published in 2000 that mainly drew on Conçeição's observations and recommendations. It appears that the professionals have been distancing themselves from the cultural practices of the small farmers.

[19] My research did not take me into areas where weeding or harvesting machines are used although these are common-place in manioc plantations in Southern Brazil.

Although most, if not quite all, of the farmers I interviewed were aware of these arguments (in particular that they should plant in rows) very few of them actually were planting in this way. Their logic was not that of the agronomists. They seemed not to be very concerned with levels of yield from their fields and saw no special reason why they should change their agricultural practices. Many small farmers simply did not have access to the labour power necessary to handle higher yields from their fields. Regardless of the manner in which the fields were planted, farmers monitored them very closely and always spotted problems with pests, diseases and predators early on because family members were frequently present in their fields to work or to pull up some roots.

On the other hand, there was a significant minority of farmers who were planting their manioc in rows – single or double rows. Although there were none in Bacá, there were some Capim farmers, north-easterners by origin, who did this. They had previously farmed in the Bragantina area, which was much closer to the influences of Belém and was affected by the modernisation of manioc production in this region between Belém and the city of Bragantina. One such farmer was from the community of Belarzinha, which was some way from the river Capim in that municipality and in an area about 400m above sea level, which is higher than most of the land in the municipality. The fertile soil and the favourable microclimate enabled farmers in Belarzinha to practice inter-cropping and to produce good crops of beans - with a surplus to sell on the market - as well as rice and maize and some other perennial cash crops. In May he fertilized his *roça* with a product supplied through the municipal authorities and then planted beans - a three-month crop. Then in June he planted manioc. The manioc benefits from the fertilizer (given that it is applied correctly) but does not grow tall enough to overshadow the beans. This farmer was *de facto* planting according to the text-books and was successful in that he was able to sell both *farinha* and beans on the local market. Few were so fortunate. He had title to more than 22 hectares of land and occupied a further 40 has. as a legal squatter. He had much more land than most farmers, but in other ways he was no different culturally from many other migrants from the Bragantina area. However, he had taken the first steps towards adopting a more 'modern' approach to agriculture. Coupled with his decision to plant in rows, use fertilisers and plant manioc in a field with another crop, it turned out that he was beginning to use fewer varieties of manioc than many other farmers in Capim - he used only five cultivars.

In Bahia, farmers who planted in rows were producing roots and/or *farinha* for the market and their mentality had moved beyond that of the subsistence farmer. They were no longer inclined primarily to produce *farinha* for the family. Neither were they inclined to cultivate

a very great number of manioc varieties. They had entered the transitional state between the semi-subsistence family farmer and the commercial farmer and had now entered a realm of farming and marketing over which they had diminishing control in a modern, capitalist market. The farmer from Belarzinha was nearly also in this transitional category, although he still retained freedom to develop his own agricultural strategy for as long as his soils remained good and his land-holdings relatively large. This issue is discussed further in the section on distribution and exchange in Chapter 8.

Between planting and harvesting

Weeding:

A field of manioc needs to be weeded from four up to ten times during the first three to four months in order to maintain the health of the crop and to give an acceptable level of productivity. Farmers in all of the case study sites were aware of this and most carried out this task themselves if there was sufficient labour in the family. It was time-consuming work carried out by hand with the *enxada*. It was most easily carried out after rain. A Bahian farmer told me that "according to the elders, weeding is as important as rain", an observation which is undisputed by agronomists.

Pruning:

Pruning manioc was an uncommon practice in three of the four the case study areas. In Pará none of the farmers visited pruned their manioc plants. Nor was pruning mentioned to me in the Inhambupe/Alagoinhas area. However, in SW Bahia, during long periods of drought when many varieties of plants can lose their leaves, pruning was not an uncommon practice, especially among larger farmers who wished to obtain new planting material (sticks of manioc) before harvesting. One farmer informed me that he was used to pruning in August - and advised that if you prune at ground level you would risk the plant not producing sufficient growth of new planting material.

Pruning was also fairly common among farmers who grew some varieties to provide their cattle and other livestock with leaves as an important ingredient of their feed. This was because pruning encourages new leaf growth. A farmer in Quaraçú produced (sweet) *aipim* for the kitchen and other *aipim* varieties for his cattle. He grew three named and one un-named varieties in a field close to his house and was the pruner *par excellence*. He chose to grow only single-stemmed varieties which had no branches because they would feed easily into the machine which ground down the leaves and woody parts of the manioc into a rough product which, when dried a little, would be fed to the cattle. This same farmer was the only

person I met who encouraged growth of a single stem of manioc along the ground. He would pin the stem down at intervals of about 20-30 cms. He would then wait until the stick rooted and sprouted and grew to 20-30 cms. and then would repeat the procedure. When I visited the field I observed several plants of a single variety planted along the ground in this way, producing tall, leafy stems which would re-grow after having been cut for the cattle.

The text-books suggest that pruning in tropical and semi-arid climatic conditions can cause disease and retard the development of the root. I am not aware of any mention of pruning in indigenous ethnographies of manioc production, and it seems likely from my interviews with older people that they did not prune their plants 'in the old days'. I was not able to ascertain why or when this practice began in this region. Yet the Quaraçú farmer mentioned above was an example of someone who was using his knowledge of manioc genetic diversity to innovate and thus satisfy his very precise requirements.

Pests, diseases and predators

Farmers have always had various kinds of problem with pests, diseases and predators that affect their crops. Each one of the case study areas has its own single predominant problem with the manioc crop. In each area farmers experimented and learned both from each other and from outsiders to help them to solve the problem. Agricultural textbooks never refer to the primary contribution of the farmer to the resolution of problems, yet my findings demonstrate that they are indeed central. They also demonstrate two other points that merit emphasis. The first of these is that farmers are well aware of the characteristics of the different varieties that are faced with pests and disease - to what extent each variety is resistant or vulnerable. The second point is the farmers' constant reference to the end use of the manioc. The manioc cycle is completed when the crop is finally transformed into human food (or fodder for animals). This explains the fact that the farmers' perception of the degree of seriousness of a particular problem that arises within the crop cycle is in direct proportion to the degree of food security – or lack of security – that he or she feels at any given time.

In Bacá many farmers had problems with a disease they called *queima* that is caused by a type of white fly on the leaves, which causes the lower leaves of the plant to yellow and dry out. Although they were concerned, the farmers did not report significant losses as a result of these infestations. They were aware that the flies appeared when the rains had been very heavy and therefore that the infestations were worse in some years than in others. Although local agronomists were unable to identify the fly it seems probable that it is one of the following: *Aleurotrachelus* ***sp,*** *Aleurothrixus* ***sp.,*** *Bemisia tubersulata and Trialeurodes variabilis* (Lozano *et al.*, 1976). One of the commonly grown local manioc varieties, *Folha*

Estreita, is the most resistant to *queima* while another popular variety, *Peixe Boi*, tends to be badly affected. It is probable that traditional populations such as the people of Bacá and the *Paraenses* of Capim plant more manioc than they need so as to allow for damage from pests, disease and predators. I was not in a position to undertake any quantitative studies of production in my case study sites but this phenomenon has been noted among the Ka'apor by Balée and Gély (1989:138) and among the Kuikuru by Carneiro (1983).

It is common for farmers in any agricultural system, whether 'Western' or more traditional, to plan for losses in production (Peter Furley: pers. comm.). It is only when there is some form of disruption in the agricultural system (e.g., loss of lands, incentives to adopt fertilizers, rapid increase in demand for the product, new roads etc.) that a farmer's ability to assess risks and to maintain control of the whole production process is challenged. As we found in Bahia, no excess can be planted. The system becomes stressed and may fail if too great a percentage of the crops of any family is eliminated due to pest or diseases.

I found that the big problem in Capim and, to a lesser degree, in SW Bahia was root-rot, *podridão*. A scientist at EMBRAPA-CPATU had diagnosed the problem in Capim to be *Pytophthora drechsleri* (E. Cardoso: pers. comm.). However, I was unable to ascertain the type of root rot affecting the Quaraçú area. In contrast to the problem of *queima* in Bacá, these fungal diseases were causing serious crop losses in Capim and, less seriously, crop losses after about 9-12 months of growth in the Quaraçú area.

An impressive example of farmers sharing their observations, expertise and concerns took place in Capim during my field visit. [20] The problem of *podridão* in Capim was so serious that it was the single topic chosen for discussion in this consultative workshop that was organised by the local Secretariat for Agriculture to celebrate the annual Manioc Festival. It became clear that both the diagnosis of the causes of the problem as well as possible solutions were in the hands of small-scale farmers themselves. Technical staff could offer no solution to the problem. Farmers were accustomed to handling their own management problems and rarely expected appropriate technical assistance but on this occasion at least the local authorities had provided something that was distinctly useful, namely, a forum for discussion.

It was becoming known in the area that a particular farmer had been conducting experiments to determine whether there were varieties more resistant to *podridão*. He was coming to the

[20] Workshop held in July 2002 in the community of Santa Júlia, Capim.

conclusion that a variety called *Maranhense* was so resistant. Another farmer reported that *macaxeira* did not suffer, although one possible explanation for this was that *macaxeira* tends to be faster growing than bitter manioc and that root rot tends to affect the crop after it has been in the ground for longer than six months.

Here is an extract, summarised and reconstructed from the recording of the discussion in that forum.

> **Agronomist**: Why do you plant different varieties of manioc in your fields, knowing that some are more resistant to *podridão* than others?
>
> **Farmer 1(male):** It's because of the colour. There is white and there is yellow. The white one gives a very bad quality [of *farinha*] but if you mix the white with the yellow it will give a good quality… And at the time of planting, I don't check whether there are two varieties; I only know that I am going to plant manioc cuttings in my field. So, in the middle of the yellow grows some white and so you get a yellow *farinha*…this is one of the reasons for mixed planting. [He went on to specify that he had been experimenting and had concluded that two varieties, the white and the yellow *Cearense,* were the best for him - which he planted together].
>
> [There followed some discussion about the advantages of the January planting (see section on seasons above.]
>
> **Farmer 2 (female)** In reply to the question, there is always that idea that there is a manioc that is good for *farinha* for the market and another to make *tapioca* and *beijú*. My grandmother planted like this, my husband also plants one sort to eat and another to sell. The *podridão* has not arrived in our region and we pray to God that it does not.
>
> **Farmer 3 (male):** We plant in a different way. We select our cuttings and check the inside of the stick.. If it is yellow, we will not plant it because it is contaminated….. Our manioc has not yet been attacked nor has my son, who is just starting to plant, had problems.
>
> **Farmer 4 (male):** In my field of 4 *tarefas,* I had several varieties, *Cearense, Tapuia, Aruã, and Pintadinha,* and not one escaped, they all rotted. But there was on one side only, a certain *Bragança* and only a third of these died. But at least a small area was left and that's why we plant several varieties. If one will not grow in one place, in the other it will recover. I am used to planting in that field and this had never happened to me before. And I thought about it, and I was uncertain, because I lost a lot. And then I thought it would be good to apply some calcium and I used more than 20 sacks…experimenting…

Although I have conveyed only a very small part of this discussion, what I have set down shows that farmers were conscious of tradition and that their choosing to grow a number of varieties related to the end use. Farmer 3 was careful not to plant contaminated cuttings while Farmer 4 had noticed that the disease struck only in one part of his field. Subsequent discussion revealed that fields were being used over and over again for up to seven years. A young man who had studied out of the area spoke, modestly, of the dangers of using land for too long without rotating production. This overuse would not have happened in the past -

even 20 years ago - when land was more plentiful and pressure from cattle ranchers less intense. In the workshop we did not learn whether the application of calcium was going to help - but the point was that the farmers were experimenting with inputs. I have included the remarks of Farmer 1 so as to indicate both the unevenness of rural knowledge and also so that his remarks can serve as a foil to the other farmers' more sophisticated contributions regarding their decision to grow different varieties for the reasons that they specified. During the same workshop there were other contributions that demonstrated that farmers knew that it could be dangerous to take cuttings from one area to another in case they were contaminated.

This workshop discussion illustrates how farmers were finding ways of resolving their own problems. They did not - and could not - wait for outsiders to do this for them. For instance, it was interesting that at no point during the workshop did any of the 40 or so farmers who were present ask for agricultural inputs to control pests or diseases, even though several experienced extension agents were in attendance. In this case in Capim, farmers were organised into active Associations and they had a sympathetic municipal authority. This social organisation facilitated farmer to farmer exchange and communication and as such was an interesting example of the way in which expert farmers can and do influence the practice of others within the area. In neither of the Bahian case-study sites did there exist any active farmers' organisations that in this respect were comparable to those of Capim.

The final threat - animal predators - was less of a problem than it used to be in the different case study sites. This is because intensifying deforestation in all of these areas, combined with the increasing concentration of human populations, had resulted in a decrease in the numbers of wild animals and game in forest areas. The main predators of manioc mentioned in the Amazon have been brocket deer, peccary and agouti.

Just as we have seen some of the ways in which farmers experiment and manage problems that affect their manioc crop - they are always innovating and experimenting - so I found that many farmers were also experimenting with new crop varieties. Yet just as innovation and experimentation can be curtailed by the multiple pressures of farming for the market and by embracing 'modern' techniques, so farmers' willingness to experiment with spontaneously occurring varieties rarely happens outside the more traditional farming environments.

Experimenting with spontaneous varieties:

In the Pará case study sites, and to a lesser extent in SW Bahia, several farmers showed active interest in experimenting with varieties of manioc that had sprung up spontaneously in

their *roças*. In most cases such plants were not named so they appear in the tables of varieties identified as 'unknown' (see Appendix 1). When a plant grows from seed, as in this case, it will not produce a root. The farmer-experimenter thus requires great patience to conduct the experiment. He or she must leave the new plant to reach a good height probably about 1.50m. or more, until it is considered mature. Then, at the appropriate time, the farmer would take stem cuttings to plant. Only when the new cuttings are mature, which might be two or more years after first identifying a potentially interesting plant, will the characteristics of the root become evident. If at that time, and for whatever reason, the plant still seems to be of interest the farmer will then give it a name and it will be incorporated into the *roça*.

In the Alagoinhas area I enquired whether farmers looked out for varieties which might have self-seeded in their fields. With a single exception they looked at me blankly and were adamant that they would throw such plants away if any were to appear. They were only mildly perplexed when I told them how a number of Amazon farmers patiently experimented with some self-seeded varieties and offered my observations in Bacá by way of example. I even mentioned some of the findings of Marianne Elias in Guyana (Elias *et al* 2000) in this respect but they were still not interested. The exception to this general lack of interest was a woman farmer near Alagoinhas who was managing 17 varieties. She was so very interested in varietal diversity that she was fascinated to accept an 'unknown' plant into her collection and to watch its performance. In the Quaraçú area only the older farmers were interested in self-seeded varieties. For many of them the pressures of commercial farming and the cultivation of the one or two profitable varieties had eroded the curiosity that their grandparents had once had.

It is encouraging that at the time of my fieldwork there were still farmers experimenting with spontaneous varieties of manioc. These farmers were continuing the tradition of their indigenous ancestors who had used manioc diversity as an integral element of their overall farming strategy. As we know from the work of Marianne Elias and her colleagues (*op. cit.*), there are indigenous farmers in Guyana who actively experiment with new varieties in the manner discussed. The interest of the findings of this research is that there are also 'non-indigenous' farmers doing likewise - and the concern is that the disposition to experiment in this way seems to have almost disappeared in Bahia.

Harvesting

When discussing the harvesting of manioc we need to recall that the root, once removed from the ground, must be processed within 24 hours. Yet it may remain in the ground, sometimes for months on end, without deteriorating. The way the roots are harvested was

very similar in all four case study sites. The essential task of pulling up the roots was still being carried out by hand. In this respect practice had changed little over the centuries. Even in the most 'sophisticated' and mechanised modern fields of Paraná in Southern Brazil the pulling up of the manioc roots was carried out by hand.

However, in the 21st century farmers are faced with increasingly complex decisions as to both the optimum time to harvest the crop and the quantity of roots to pull up at any one time. Farmers who grow a wide variety of manioc can have more control over their crop cycle, including the decisions they make regarding the optimum time to harvest the crop. Each variety will be at its best over a period of a few months as the figures of Appendix 8 indicate. Farmers remember very exactly when a particular *roça* was planted and know when each variety in that field is likely to be at its best.

In the smaller less commercial farms harvesting was frequently women's work and children usually helped out as well. Each week manioc was lifted for processing. Where most of the produce was to be sold (rather than to be consumed in the family) it was increasingly common for men to undertake this work. An elderly lady in Capim remembered how it used to be:

> 'A little child, five or ten years old, already works with manioc - the child is already carrying a share of manioc in the basket…and brings it to mother for her to kneed…things have changed…'

Here she was remembering how harvesting was a family occupation involving even little children. When she commented that things had changed, she would have been referring to the fact that small children might be working less as more of them went to school. She might also have been reflecting on the way things were now being done in the larger farms where work was more pressured and where activity in the *casa de farinha* was producing *farinha*, but not for the family alone.

In smaller fields and in places where only a small number of roots were harvested at any one time, for example in Bacá and in some parts of Capim, the root was pulled out of the ground and the stem immediately severed and left lying on the ground. On those occasions when several members of the family were working the stem might be picked up, the top and the side branches removed with a large knife and left on the ground and the woody stem, which is the source of cuttings for the next planting, then stacked. Few of the varieties being cultivated were so large that they could not be pulled up in this manner. Some kind of tool, the *enxada* or a machete, was used only for the larger-sized roots but these tended not to be

utilised as they once were since farmers increasingly need quick returns on their planting. The large-rooted varieties tend to take three or more years to reach maturity.

Apart from the characteristics of individual varieties discussed elsewhere, several factors impact on the farmers' decisions as to the optimum time to harvest manioc and the amount of roots to pull up at any one time. These factors include:

1. The mode of production of *farinha* and of other starch foods (whether this be in a small place, a small scale family-run business or a small scale rural industry - see Chapter 7 on food production).
2. The market for the product, whether a food product or fresh roots, where either all is to be sold or only some sold and the rest used for family consumption (see Chapter 8 on distribution and exchange).
3. Whether the land must be replanted quickly or whether it can be left fallow following the harvest (depending on the availability of land to the farmer).
4. The available human, animal, river or motor transport.

In those households that produce their own *farinha* and starch foods, using family and community labour, manioc was being harvested only in quantities that could be processed immediately by the available labour. There was the most direct link between the harvesting of the crop, its conversion into *farinha* and its consumption by the family over the following days. There was a weekly rhythm to the work as weekly markets must be supplied with *farinha*. Even today this is what forest and indigenous people do in large areas of the Amazon. Until about 50 years ago this was also the custom of hundreds of thousands among rural people in Bahia - and most everywhere else - but this rhythm has been changing and continues to change.

New types of demand for food products and fresh roots from individuals and enterprises in the mushrooming conurbations are some of the market pressures that I discuss in the section on distribution and exchange in Chapter 8. They impact strongly on what the farmers do at harvesting time.

The practice of some of the more commercially oriented farmers who produce fresh roots for the market in SW Bahia differs from those of the small and medium scale manioc and *farinha* producers mentioned above. When a farmer decided that it was time to sell his crop he or she would reach an agreement with a trader or with the owner of a local rural enterprise manufacturing *farinha* and would sell the crop on a single day. The crop was pulled up by

paid labourers as well as by members of the farmer's family, loaded onto the trader's truck and removed to its destination that same day or at first light the following day. The roots would be processed within 24 hours of harvesting. An entire field might be cleared in this way to supply rural and peri-urban small industry.

The farmers who harvested their whole crop from a field at one time, as in the case cited above, were still the exception to the rule in the case study areas, even in Bahia. However, in the areas where there were local starch and/or *farinha* industries [21] there was increasing pressure on farmers to do this. These tended to be the farmers who had decided to grow no more than just the one or two varieties of manioc that offered a high yield per hectare. If this trend remains sustainable, which is questionable, we may be witnessing the 'Paraná-isation' of manioc farming in these highly productive regions of Bahia. This trend is further discussed in Chapter 8.

In Capim and in the Bahian case study areas farmers had neither the land nor the time available to leave areas fallow as had been the practice in the past. The pressures on land, as well as the inducements on farmers to produce *farinha* to sell, limited their scope to decide exactly when to harvest the crop. Older people remembered how, when they were younger, they would leave land fallow or practise rotating cultivation and they observed how difficult it was now to do this. Only in Bacá was there generally no hurry to harvest the entire manioc crop from the fields and there was no hurry either to clear them for replanting. This was partly because Bacá farmers were only supplying a very small local market and also because they lacked the machinery to enable them to quickly process manioc into *farinha*. Nowadays, a *roça* is likely to be re-planted once only before the land is left fallow for a very long time, maybe for 20 years, following indigenous practices.

In Bacá, the amount of manioc that could be pulled up from the ground at any one time could not be greater than the amount which could be carried on people's backs and/or in canoes. The crop had to be harvested and removed from the field to the *retiro* in the limited time available of a single day. The same restrictions applied where farmers made *farinha* in tiny *retiros* on the edge of their *roça.* The *farinha* thus produced had to be carried back home at the end of the day. The people of Bacá did not use animals to transport their goods and their fields were mainly quite inaccessible to vehicles. In Capim and SW Bahia animals owned by small farmers were used in various ways to transport roots from the fields to the *casas de*

[21] - eg. In the Quaraçú area of SW Bahia as well as in the municipality of Crisópolis and elsewhere around Inhambupe in the *Agreste* of Alagoinhas

farinha. Farmers therefore were able to control this type of animal transport and it enabled them to harvest sufficient roots to supply a small-scale, family run *casa de farinha*.

In contrast, small-scale farmers had no control over motor transport. They did not have the capital available to run vehicles. These were run by traders and owners of rural industries whose requirements influenced both the time that harvesting must take place and the quantity of roots that would be harvested at any one time. Although the continued improvement of road networks was opening up areas with traditional forms of production to potential new markets, family farmers had little or no control over the terms of trade (see the section on distribution and exchange in Chapter 8). Motorised forms of transport tended only to be used to remove manioc roots from the *roças* when those roots were to be transported to rural or peri-urban industries for processing, and not to the family-run *casas de farinha.*

As the crop cycle comes to its close, and as farmers begin to contemplate the work to be done to complete the Manioc Chain, the nature of the decisions to be taken becomes more complex for those farmers who are nearer to – and/or relating more closely to – the larger markets. As we have seen, decisions relating to harvesting or 'pulling up' of the crop are rendered more complex today by market factors than they generally were around 50 years ago. On the other hand, a different kind of complexity exists when – today or in the past – many different varieties are being cultivated. As I found, where there are many varieties the family had the advantage of flexibility. They could exercise greater choice as to when to pull up roots - at least for the manioc that was consumed by the family or sold in very local markets.

After the harvest: preparing new planting material

As the manioc cycle is completed, and as the fields are cleared, so one product of the harvest - the woody stems of the manioc - is collected and stored in preparation for the next planting, once the time is right. When I arrived in Quaraçú it was November and farmers were already anticipating the next planting. Manioc sticks were to be found everywhere in the small town. The sticks were never smaller than one metre but were more often between 1.5 and 2 metres. They were stacked vertically outside houses and horizontally in simple carts. They would eventually be carried off from the town to the fields by mules. Similar stacks were to be found at the edges of many of the fields. It was explained to me that, when they had to be kept for four or more months, the sticks were stacked vertically in pyramids. When harvested later to be stored for only one or two months, horizontal stacking was considered satisfactory, with the base of the stem pointing towards the east, towards the rising sun. This practice could be explained by the need to protect the more tender tips of the

cuttings as the cool of the night and early morning give way to the harsh rays of the morning sun.

The completion of the cycle sometimes featured gifts of planting material by one farmer to another. This planting material might be given away for various reasons. This might be because the receiving farmer wants to grow a favoured variety that his or her neighbour has grown in the season just passing. Or it might be so as to make up for a farmer's loss of planting material through pests or disease. A farmer in Capim explained why he always gave cuttings to others according to the principle of reciprocity: he told me 'you never know when you might need some'. Rarely was planting material sold in the farmers' realm in any of the four case study sites - although larger-scale farmers were busy buying and selling planting stock. The reciprocal giving and receiving of manioc stems was a practice that was still well embedded in the rural culture of these manioc-growing areas. This feature of the culture indicates that manioc is life itself for these communities. The logic is that it should not be exchanged as a commodity but rather should be used to reinforce the sense of common purpose and common values within a community and between communities. Moreover, by reinforcing life and commonality with other farming families, I found that farmers were still able to regularly incorporate new varieties into their stock if they chose to do so. This counter-capitalist reciprocal aspect of the farmer-manioc culture plays its part in helping to sustain agrobiodiversity in manioc farming - but for how much longer?

CONCLUSION

In this chapter we have followed the family farmers as they move through the successive stages of the crop cycle and have demonstrated the multiple ways in which they have been managing their manioc production and genetic diversity to their own ends. At every stage in the cycle farmers may need to - or may choose to - handle different varieties in slightly different ways. The length of stem cutting, the manner in which the cutting is planted and the way in which the planting is arranged in any given *roça*, all can depend on the particular variety or varieties which the farmer is cultivating. We have seen some of the ways in which farmers explore solutions, for example to threats from plant disease or pests, and we have noted their confidence and self-respect. Co-existing with, but also standing a little apart from social differentiation in the countryside there is that other significant distinction, which goes largely unrecognised in the outside world. This is the distinction that is afforded by expertise - that of the expert farmer who is a specialist, amongst other things, in managing genetic diversity and who is curious and experimental. His or her management practices very frequently served as a model for others both in the local and in neighbouring communities.

Yet there are social, political and economic forces against which farmers have almost no power. This is so when the concentration of land in the hands of a few prevents families clearing *roças* almost at will, as in most places their grandparents had once able been to do. True, farmers can try and adapt by rotating varieties within their few *roças* but, inevitably, pressure on land means that the area that can be left fallow is diminished and the length of time that the land can rest is also reduced. It is for this reason that in Capim or in Bahia, for example, whenever the crop of a land-poor farming family fails, the most likely outcome is that they will be forced to sell their plots to a rancher and will then either leave farming altogether or find work as best they can as day labourers.

As we reflect on the value of the genetic resources in manioc that the farmers adapt and utilise to meet their own needs, the most compelling and alarming conclusion that emerges is that modernisation in agriculture is the enemy of agrobiodiversity. Few researchers, scientists and practitioners are likely to disagree. Much of the scholarly literature on this theme reaches this same conclusion, albeit sometimes by different routes. (eg. Wood and Lenné (1999), Cooper *et al*. (1992), Wood *et al*. (2000), Brookfield (2001) and the contributors to Brookfield *et al.* (2003)

Nevertheless, a rich genetic diversity in manioc still survives in Brazil. It need not die if the small farmers' cultural resilience and their methods of adaptation to the contemporary world can be understood, respected and encouraged by all those who purport to work with them. It may be too late for those who cultivate wheat, maize, rice and many other world food commodities. Yet it need not be too late for manioc and for the men and women who know most about it and who depend on it. As we will see in the two following chapters about subsequent stages in the Manioc Chain, farmers and their families - some more than others - continue to bring the same innovative and adaptive spirit to bear upon the production, consumption, distribution and exchange of the various food products of manioc as they do the cultivation of the crop. Here, too, lies hope for a positive outcome, rooted in the farmers' knowledge and skills.

CHAPTER 7

THE PRODUCTION OF MANIOC FOODS

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INTRODUCTION

The production process within the Manioc Chain for family farmers consists of two distinct types of activity. The previous chapter addressed the manner in which the *crop* is produced. In this chapter, I examine the ways in which the *foods* are produced and the significance of this work both in domestic life and in rural society. Following on from the production of the crop, food production is the second distinct type of productive activity within the Manioc Chain.

Two main aspects of food production are discussed in this chapter. The first aspect is the use of the many manioc varieties in the production of foods, both for family consumption and for the market. The second aspect is the way in which farmers as food producers have responded to change during the twentieth century by adapting their technologies, and the social and economic significance of these adaptive responses. I argue that these responses to change, whether this is environmental, economic or political in character, usually enable small-scale farmers to ensure the food security of themselves and of the millions of people whom they supply in local and urban markets. However, the processes involved in this local form of dynamic small to medium-scale food production are scarcely valued by economists and rural development planners. There is the danger that this industry, largely unknown to outsiders, might be damaged by default in a political environment where there is anyway an increasing emphasis on the highly capitalised sectors of Brazil's agricultural and food production.

The analysis in this chapter is supported by detailed accounts of production processes in some of the case study sites which is presented in the Appendices 4A-4F and 5. This material illustrates both the diverse practice and some of the complexities encountered in the food production processes. This allows for a more grounded discussion. The analysis of field observations about food production, and subsequently about consumption in Chapter 8, adds a Brazilian dimension to the body of contemporary literature that is concerned with food as culture and food as identity to which I refer in Chapter 8 as well as in Chapter 2. However, this literature does not draw that intimate link between the local production and the marketing and consumption of food that I try to do in this study. (Sutton, 2001, Mennel *et al..*, 1992, Bell and Valentine, 1997, Counihan and van Esterick, 1997, Douglas, 1971)

In order to be selective from within a huge amount of empirical material, I focus on the production of just three important food products, *farinha* and two starch foods, *beijú* and *biscoitos* for the reasons explained below. I then describe and discuss the production processes in three distinct categories of *casas de farinha*: the 'tiny places', the small-scale family-run businesses and the rural industries. [1] The categories are also explained below.

This chapter analyses how the production of manioc foods is embedded in the local culture and economy in the case study areas and, in particular, how this cultural embeddedness has changed in recent decades. The chapter places the people who make the foods in their homes or communities at the centre of a geographically specific picture and at the heart of a narrative that explores the history of everyday food and everyday life and that makes clear the link with food security.

A STABLE AND PREDICTABLE SUPPLY-– AND CONSTANT INNOVATION

In Pará and Bahia both traditional and innovative manioc-based food products provide for the food security needs of millions of rural people and the poorest urban people, many of whom still have close family links in the rural areas. That this is possible depends on:

- The local availability and sustainability of a stable and predictable supply of this staple food crop in its multiple varieties to match and meet a largely inelastic demand
- The development and constant innovative adaptation of tried and tested systems of both crop and post-harvest food production

I know of very few studies of the production of *farinha* and manioc foods, but the few quantitative studies to which I have had access do not refer to manioc varieties. (e.g., Figueiredo, 2000) The production of manioc roots is usually cited as a single value in tons. The yield per hectare is disaggregated by variety only for the purposes of field trials designed to test and compare varietal yield. When it is the production of a given *roça* that is measured I know of no study where the varietal composition of the *roça* has been recorded. However, the range of varieties cultivated by family farmers does provide them with options

[1] The term *casa de farinha* is the generic term to signify a place where *farinha* is made. However, this term is only actually used colloquially in the Alagoinhas area and not in the other three case study sites. In Gurupá and Capim, the term *retiro* is used. In SW Bahia people talk about the *ca' de rodo* colloquially or *casa de rodo*. I use the local Portuguese term, depending on the location to which I refer. See the glossary for more information.

in their manufacture of *farinha* in particular as well as several starch-based foods. The variety or varieties processed in any one operation in a *casa de farinha* impact on aspects of the production process and outcomes in ways including:

- The amount of time taken to peel or scrap the roots – also whether they can be peeled *or* scraped (this affects the wages paid to these female workers and/or the amount of effort they expend in this task).
- The length of time a given variety must be soaked before processing.
- If varieties are to be blended in the production of *farinha* or starch, the farmer/producer will know which varieties blend well and which do not.
- Some varieties dry more easily and quickly than others in the *farinha*-making process (this quality also can vary according to whether the root has been harvested when the earth is wet or whether it has been harvested very late in its own cycle).
- The colour of each variety influences the ultimate colour of the final product and thus its acceptability within the family and beyond.
- The taste of each variety or blend of varieties.
- The suitability of certain varieties (usually the degree of 'bitterness' or toxicity) when making special foods for infants, frail elderly people and the sick.
- Some varieties produce more starch than others, a factor that is particularly significant for those who only make starch foods.

Those farmers/producers who are familiar with the characteristics of the varieties that they cultivate or that are cultivated in their area have greater control in the first instance over the genetic diversity of their crop and in the second instance over their food production process.

Detailed field observations illustrate the strategies that are followed by the family farmers. The empirical findings embrace not only the use of different varieties of manioc but also the material aspects of the technologies involved – specifically artefacts, materials, and energy sources. (Gille, 1978) They also embrace the techniques, skills and the knowledge base of the producers. The technological processes are carried out in particular sequences and specific locations and under the control of distinguishable groups of people. (Narotozky, 1997:18). As such, these processes both reflect and influence social relations in the localities. Knowledge and skills also enter into social organisation as happens, for example, with gender divisions in work or in those instances where appropriately skilled individuals become crucial to a particular technological process or technique.

One of the features of this study is technological change in the production of both *farinha* and starch-based foods in terms both of technological borrowing, from the 'outside' and of technological invention within particular communities. I examine the material culture and therefore both the material and cultural capital of the producers. The practical knowledge of

the producers, the 'intelligent application of human effort' (Narotzky, 1997), the use of labour power from both within the extended family and the environmental impact of manioc processing and beyond make the *casa de farinha* a technologically and socially very interesting place.

Each *casa de farinha* is unique as the detailed appendices (4A to 4C) to the chapter demonstrate. Each place is managed by the small farmer/food producer who makes maximum use of the diversity of his and her manioc varieties in an extraordinarily diverse realm of production that, mostly in small and incremental ways, is constantly being adapted and changed.

Three foods

There are thousands of foods and drinks produced from manioc and its derivatives, whether sweet or savoury, indigenous or 'modern'. Some collections of recipes have been published while most Brazilian cook-books contain recipes that require ingredients derived from manioc. [2] However, an exploration of this rich diversity in Brazilian manioc food culture, which is alluded to in some general studies and in a number of Amazonian ethnographies, falls beyond the scope of this study. (see for example, Pinto de Aguiar, 1982, Cascudo, 1962, Orico, 1972, Costa, 1994 and C. Hugh-Jones, 1979).

I have chosen to focus attention on just three of the most important food products produced in my four case-study areas: *farinha*, which is a staple food in the north and north east of Brazil, and two starch-based foods, *beijú* and *biscoitos*. This is so as to reach an understanding of what change has occurred in the production, distribution and consumption cycle of key foods within the living memory of small farmers. I have adopted Marx's method and order (Marx [1859]) for the discussion of this cycle, the Manioc Cycle, for the reasons set out in Part 3 of Chapter 2. There is an almost seamless movement of this commodity within the farming household from the *roça* and the *casa de farinha* to the mouth – in other words, from the production of the crop and the food through distribution and exchange to the consumption of that food, whether by those who have made it or by those who have been given it or who have bought it. The family farmers who are the subject of my study primarily produce their crop to ensure that they and their families can eat the product of their labours.

[2] Pereira, 1983 is an example of a collection, clearly compiled not for the cook, but for the archives. By contrast, Paloma Amado Costa's lovely Bahian cookbook (1994) is published both for the cook and the lover of Bahian culture. EMATER's booklet on the use of tapioca (1998) also lacks any cultural feel for Paraense cooking.

Classifying the *casas de farinha*

In order to construct a framework for the analysis of the nature, causes and impacts of change in the production cycle for the most important of the three selected manioc foods, I have adopted a method of classifying the *casas de farinha* which, although apparently corresponding to social class or social status within the rural communities, in fact only corresponds to different levels of technology. This classification is equally relevant to the site of manufacture of *beijú*, *biscoitos* and other food products.

By dividing these places of production into tiny places, small-scale family businesses and rural industries, we are able to compare and contrast places of similar status between field sites. Yet this methodology does not automatically enable us to associate social class with technological levels used in *farinha* production. Perceptions can be deceptive. So, for example, all of my informants in Bahia, on viewing the photos that I showed them of the 'tiny place' in Bacá described in Appendix 4B, were astounded that such 'primitive' places still existed. Yet they were also fascinated to recognise the *tipití* [3] and various kinds of *beijús* being made with which they too were familiar. Bahian informants associated the level of technology used in both Bacá and Capim with poorer or lower status rural families because most Bahian small farmers are using a motorised *forno* [4] and a wooden press. In fact, the Bacá *retiro* belongs to one of the more influential, respected and knowledgeable farming families in the community and that of Capim to a successful and innovative small farmer.

I present a case example in Appendix 4A about the production of *farinha* in one small *retiro* in rural Capim, which analyses this process in its wider context. Appendix 4B presents a description of the production process in a tiny *retiro* in Bacá and is presented as a contrast to the Capim study. In each case, I aim to give a sense of what is happening in these particular places and what changes have been introduced over the decades of living memory. The figures in the Appendices 4A and 4B illustrate the steps followed in Capim and Bacá respectively in the processing of the manioc roots and the figure in Appendix 4F demonstrates the process used for making fermented starch in Quaraçú. Appendix 4C, presented in note form, outlines the different steps in the process of making *beijú* and other

[3] The tipití is an elongated device woven from types of grassy fiber used for wringing manioc pulp dry and thus helping to remove the poisonous hydrocyanic acid. According to archaeologist Linda Mowat, it may not be of great antiquity. 'It is found among tribes whose manioc horticulture is well developed, but has failed to reach groups on the headwaters of the Amazon to whom cultivation is less significant. As squeezing technology therefore appears to be in an evolutionary state, the *tipití* may be a relatively recent invention'. (Mowat, 1989)

[4] *Forno* is the large griddle on which *farinha* is toasted.

types of starch foods in three places in the Alagoinhas and Inhambupe area to illustrate the diversity of processes. Finally, Appendix 6 presents a record of the samples of *farinhas* and starch foods collected during fieldwork in the four sites and a brief description of each one. It is included to illustrate the diversity of these foods. The photographs presented at the beginning of the chapter illustrate some of the processes and equipment and were taken during fieldwork.

Farinha, biscoito and *beijú*

Of these three foods *farinha* is the one that is most significant for food security. It is consumed every day by virtually every family in the four case study areas and, indeed, by most rural families in Amazônia and north-east Brazil. *Farinha* is also the principal product of manioc in the geographical areas under study and thus has both cultural and economic significance. The food is probably the most ancient processed food known in northern Brazil and in some neighbouring Amazonian countries. Once harvested, manioc cannot normally be kept for more than a day or two, with the technologies that are available to small farmers.[5] Consequently it must be transformed immediately into a product which can be stored. *Farinha* is the first and most common of such products. Then come starch and starch-based foods.

Westerners have been known to describe *farinha* as being like sawdust which, to look at, it superficially resembles, although it seems to me to more closely resemble dried breadcrumbs. It is a dry powdery or grainy substance, depending on its provenance, which is eaten either on its own or with fish, meats, *açaí* (the fruit of the palm *Euterpe oleracea,* much appreciated in Pará), beans, soups and stews. It soaks up liquids and fat or is a crunchy, filling accompaniment to a meal. Many in the north and NE of Brazil also eat it dry, by the handful. In Bahia, the preferred *farinha*s are white, from very white through lemony white to off-white, and fine to very fine in texture. There is one exception. I found that a fine grained, strong yellow *farinha* usually known as *farinha amarela* or *copioba* [6] was more expensive than other *farinha*s in the markets that I visited in Bahia during field research. This *farinha* is usually artificially coloured with a chemical although I was

[5] It is possible to store fresh roots in sealed pits underground for many months. This practice has been documented among the some peoples in Amazônia and is also known to some farmers in SW Bahia according to one informant in Campinhos, Conquista (BA). The practice appears not to have been widely used. (Interview Dra Sandra, from the NGO, CCPA, Manaus, October 1998) Both Conceição (1981) and Cock (1985) state that this method of storage only works for around 2 months. Indigenous knowledge appears to be more advanced in this respect.

[6] The *farinha* widely known as *copioba* is fine and yellow. However, according to one informant, this name is given to other fine white *farinhas* in Sto. Antônio de Jesús, Bahia.

informed that a naturally yellow fine *farinha* is made in Sto. Antônio de Jesús. This naturally yellow *farinha* is the benchmark for the artificially coloured type but *farinha* specialists among farmers do not rate the artificially dyed kind.

In Pará, the *farinha*s are quite different. The preferred *farinha*s are not white but yellow - shades of yellow from dark yellow through strong yellow to pale or creamy yellow to creamy. All these types are much rougher than the Bahian *farinha*s with larger crunchy or crisp granules. The description of samples taken during field studies are indicative of the diversity of *farinhas* encountered and are set out in Appendix 6.

Manioc roots can be exploited only for the starch or for *farinha* and starch. [7] Whatever the decision of the farmer/producer, the extraction of starch is an ancient process just as is the making of *beijú*, and, including in post colonial times, the *biscoito*. (See Tables 7-1 and 7-2)

Table 7-1

Some of the starches used for the manufacture of *biscoitos* in one small factory in Simão, Vitória da Conquista, 3 January 2002 - provenance and price.

Product	Provenance of Product		Price
	Manufacturer	Location	
Goma (fermentada) (fermented manioc starch)	Small, household industries.	Local. Four neighbourhoods of Conquista: Simão, Campinhos, Pradoso, Belo Campo.	$R30/50kgs
Goma doce		Uberlândia, Minas Gerais.	
Fécula (fine manioc starch – not fermented)	Amafil (HQ in Cianorte, Paraná)	Altônia, Paraná.	$R15/25kgs
Wheat flour	-	From Canada (via the port of Ilheus).	$R48/50kgs (price fluctuates with the US dollar)
Corn flour	National Starch, Cargill.	São Paulo	unavailable

[7] In Bahia, if starch is extracted from manioc during processing, the resultant *farinha* is considered by many local people to be inferior in quality and particularly in flavour.

Table 7-2

Manioc starches used in the manufacture of *biscoitos* in SW Bahia

Local name of starch product in SW Bahia	Synonyms used in other parts of Brazil	Description of starch	Other observations
Goma doce (sweet powdered starch)	*Polvilho, fécula. Tapioca (*in Alagoinhas (BA.)	White, fine or finish texture.	Local *biscoito* makers in Conquista distinguish between this product, made either locally or bought from Minas Gerais, and the product which they call *fécula* (see below).
Goma (fermentada) (Fermented powdered starch)	*Goma azeda, polvilho azedo.*	White, very fine, sometimes almost powdery. It is a 'live' product that rises slightly when baked (in the way that baking powder rises).	Starch extracted from manioc roots and initially suspended in water is left to ferment over a period of several days - as little as 5-6 days in very hot sun, 8 or more days if it's wet or cold: (15-25 days in the modern industrial process (ABAM 1999). The water is then discarded and the starch is spread out to dry in the sun for about one day. Several informants told me that the starch could only be dried in the sun - not in any other way. This product is manufactured in Paraná albeit in much smaller quantities than f*écula.* This product cannot be used in the making of bread. 'Sweet' or 'bitter' varieties of manioc may be used.
Fécula (Edible starch)	*Polvilho, polvilho doce*	White, minutely fine granules (i.e., it pours well, unlike the locally made *goma doce*) and it is odourless.	This term is used in all four of my case-study areas to refer to starch manufactured in Paraná and widely exported to other regions of Brazil. This product may be (and is sometimes) used with wheat flour in bread-making. It is also used in the pharmaceutical and chemical industries as well as for glues, paints and varnishes, paper and even for explosives and lubricants. (ABAM 1999) The industrial processes for making *fécula* and *goma fermentada* are distinctly different. There were no *fécula* industries in SW Bahia, although a factory in the town of Tremedal was manufacturing *goma* and is able to manufacture *goma doce*. A *fécula* plant in Salinas, northern Minas Gerais was unsuccessful and had closed by the time of my fieldwork in October 2002.
Puba seca	*Carimã*	Soft, white, as fine as talcum powder	The same as *goma*, but finer. The *goma* is passed through a fine sieve.

Biscoitos, these crispy, puffy, light snacks are filling and infinitely varied. In SW Bahia, the *biscoito* is still usually made with fermented manioc starch, eggs and some kind of fat - margarine today, pork dripping or lard in the old days. Other starches or mixtures of starches are used, but the most common is *goma*, (manioc starch - both fermented and 'sweet' – see Table 7-2).

The *biscoito* is sometimes round or oblong, sometimes in the shape of a small donut, sometimes as large as a golf ball or a woman's fist. They can be tiny too, like a grape or a mini-biscuit one or two centimetres square. *Biscoitos* are reminiscent of some of the crispy snacks that are available in packets in shops and pubs in the UK and that are usually made from other starches. They can be light in weight - puffy balls - as is the type called *avoador* (aviator). Others are of a denser, heavier texture such as the *biscoito cozido e assado* (the boiled and baked ones). The elongated ones are called *chiringa*, after the action with a make-shift piping bag to squeeze the dough onto the baking tray. Many varieties have a shelf-life of up to 60 days.

Beiju was originally, and still is in many parts, flat unleavened bread made either from grated manioc, manioc starch or a mixture of the two ingredients. No other ingredients are required. *Beijús* in the Inhambupe/Alagoinhas region today, as well as in the Pará case study sites, are different. They are usually made from fine, white manioc starch (sometimes fermented) which is locally called *tapioca* or more generically simply *goma* (see Table 7-2 for terms). There are quite a few shapes, sizes and styles of *beijú* (eg. *beijú de colher, beijú seco, beijú lencol, beijú canoinha)*. They are usually fine or very fine, smooth or very smooth and crisp - a little like biscuits in that they are flat, although in flavour unlike the biscuits familiar to us in Western Europe. There is one known as *beijú de tapioca* (or just *tapioca*) which is like a fine, white pancake and can be served hot, spread with melted butter or margarine or sprinkled with grated coconut, rolled up and moistened with coconut milk. Some urban consumers today enjoy this and other *beijús* with a grated *parmesão* cheese that is similar to the Italian parmesan.

The variety that is not made with *tapioca* is made from the washed and grated pulp of manioc, formed into a round biscuit-shape of around 6cms. in diameter and toasted on the *forno*. This is a heavy food locally called *beijú de massa.*

Food technology in a realm in transition

The *casas de farinha* can be scenes of important technological innovation, which can alter relations within a rural family or community. There might just be a shop in the local town, if you know where to find it, that supplies items of equipment. More probably, whatever is needed is adapted to purpose or manufactured within the community. Yet none of this activity is immediately apparent. People who have occasion to travel in Brazil's interior, on observing a *casa de farinha* in a village, might conclude quite reasonably that the set-up is primitive. Women and children, sitting on the ground, scrape or peel the roots [8] by hand while a superficial glance at the building suggests an unruly process in an environment that is frequently clouded with fine white dust.

These cottage 'factories' are littered with tubs of manioc roots, which sometimes are being soaked or washed prior to grating. The heaps of smelly pulp are then pressed in extraordinary Heath-Robinson-type structures designed to expel the poisonous liquid. This poisonous effluent drains away from the house, sometimes to a foul smelling, stagnant pond nearby or sometimes it just soaks into the ground towards the back of the house. Somewhere at the heart of the house is the *forno* or huge griddle where the *farinha* is toasted. The *fornos* are wood-burning and must be constantly stoked and watched. The casual observer will notice a motley collection of containers of *farinha* in various stages of preparation as it is moved from the *forno*, eventually to be prepared for removal to market or kitchen.

Yet, despite what might be the impressions of a casual urban observer, every single *casa de farinha* is different one from the other and it is in these differences that we can glimpse how innovations grow from a deeply ingrained culture and affect a central aspect of the family and rural economy. Every part of the production process has its own vital logic.

The 'realm' referred to denotes the *habitus* of the small farmers-as-food-makers, or more precisely, the 'schemes of the *habitus*' (Bourdieu 1999a:466). [9] The techniques and technologies of processing manioc continue to involve farmers of all generations in caring for a *roça* of manioc and in making *farinha* and starch almost as an 'automatic gesture'. In the small and medium *casas de farinha* the making of *farinha* is never the same on any two consecutive days and least of all is it the same from one place to another. No two *biscoitos* or *beijús* are made in the same way. Isabel Allende's delightful prose, in conveying the

[8] A woman in Bacá, disparagingly described the scraping of manioc roots as 'Portuguese style'.

[9] Bourdieu appropriates and develops a meaning for this term which he applies as a 'thinking tool' (Jenkins (1998:67). In *Distinction* (1999a:466) he further enhances this notion in these words: 'The schemes of the *habitus* …orienting practices practically, they embed what some would call mistakenly *values* in the most automatic gestures or the apparent most insignificant techniques of the body…'

creativity of a cook, conjures up the pride and confidence that is to be found also among these manioc food-makers as well as their urge to innovate:

> 'In the many years of my friendship with this splendid woman, I have never seen her serve the same dish twice she always introduces some variation and garnishes her creations with such originality that in her hands a common cabbage is transformed into a work of art, like an ikebana, one of those Japanese floral arrangements with two chrysanthemums and a twisted branch. Triumph of aesthetics over paucity.' (Allende, 1998)

This urge to innovate also applies to the tools made and to the equipment that are used in the making of foods. In Bacá, Gurupá, the equipment was almost all made in the community. The *tipitís* and sieves were made by a local woman, baskets and woven implements, *cochos* and other wooden equipment were usually made by the men of the households or bought from another man. Only margarine buckets and aluminium basins were acquired on the external market in addition to the metal *forno*. In the other case study sites, where more money circulated in the local economy, the large capital items, the *forno*, the motor for the grater and the wooden press were all purchased. In all but the largest, most commercial enterprises many other tools and items of equipment were locally made from local materials (e.g., sieves, *cochos*, baskets of various kinds, the *rodo* or paddle for stirring *farinha*, timber for the construction of the wooden press). The imprint of the individual farming family was evident in each place. The older the farmers the more likely it was that their equipment and tools would be made locally according to traditional designs. Younger farmers would innovate, sometimes using items or materials they purchased or otherwise acquired from other places. Examples were plastic and/or aluminium buckets and basins, Eternit moulded fibre cement or plastic tanks, barrels for soaking roots and nylon mesh for sieves.

None of this is at all surprising, because there are no retail outlets that do business in the paraphernalia necessary for this type of artesanal or semi-artesanal food production. One small farmer in Fé em Deus, Capim, remembered using the *tipití*, for wringing dry the grated roots, that he had now been able to replace with a wooden press. Remembering the recent past, he told me with some frustration:

> 'I don't even want to know about those things…the sieve, the basket…I learnt how to make all kinds of woven things because you couldn't buy them.'

The sieve is now frequently made using nylon mesh on a simply constructed wooden frame and the basket, to which this farmer referred, was the type of basket which, lined with banana leaves, was used to transport *farinha*. This has now been replaced comprehensively in Capim with the nylon sack.

Only in São Domingos do Capim was there a shop in town that sold some agricultural tools and also sold *fornos*: only *fornos*. Specialist small engineering firms were manufacturing *fornos* and, in Bahia and Sergipe, some of the other equipment used by my informants. I was informed that there was one such firm in Castanhal, Pará, another just over the Bahia-Sergipe border in Tobias Barreto (which I was able to visit), one in Sto. Antônio de Jesús and one in Conquista. Although it is quite possible that such firms exist in Feira de Santana and Salvador, and possibly in Belém in Pará, none of my informants were supplied from these cities. The marketing of more advanced equipment, of tools and machinery for the manufacture of manioc foods in small rural enterprises, takes place through word of mouth. Other tools and simple equipment are still devised by the individual family, sometimes making use of old items and adapting certain other things, such as containers, to their specific needs.

When discussing technological change for the processing of *farinha* and manioc foods, it is relevant that the areas in which I was working in the interior of north and north-east Brazil are still in the process of acquiring some of the infrastructure that we have enjoyed in most of Western Europe for more than a century. For example, most of the small towns and villages in which I worked in Bahia now had access to mains electricity, although none of the villages had had access to electricity for more than one generation. Mains electricity was not available in rural Gurupá and the lines only extended a short distance outside the town of São Domingos do Capim. The first telephones were installed in the town of Gurupá at the end of 2001, shortly before my arrival, and Capim had been connected to the telephone network for only a little longer. The first road connecting Capim to the Bélem-Brasília highway had been opened in about 1990.

Environmental impacts of the large *casas de farinha*

One of the most problematic issues - and yet one that is undebated within the sphere of family agriculture - arises from the processing of manioc roots and the disposal of the effluent. In some cases farmers have found uses for the effluent but more usually it drains away into ponds where it can become a public health hazard.

When the grated mass of manioc is squeezed dry, whether using the old *tipití* or the wooden press, the liquid expelled in this process, which is known as *manicueira or manipueira,* is initially somewhat poisonous. How much so depends on whether the manioc has been soaked or whether it has been grated dry. Approximately one litre of *manipueira* is produced from the first drying of 3 kilos of fresh roots (Ponte, 2000). Ponte cites his own

research when listing the chemical composition of this effluent and demonstrates its economic value both as a fertiliser and as an insecticide among other uses. (Table 7-3)

Table 7- 3: Chemical composition of *manipueira* (average of 20 samples analysed).

Component	Amount (ppm)
Nitrogen (N)	425.5
Phosphoros (P)	259.5
Potassium (K)	1853.5
Calcium (Ca)	227.5
Magnesium (Mg)	405.0
Sulphur (S)	195
Iron (Fe)	15.3
Zinc (Zn)	4.2
Copper (Cu)	11.5
Manganese (Mn)	3.7
Boron (B)	5.0
Free cyanide (CN)	42.5
Total cyanide (CN)	604.0*

* 55 mg/l on average

- ppm – parts per million

Source: Ponte (2000)

When this water is left to settle in a recipient, the starch sediment, as we have seen, is an important economic product of manioc. Farmers know that the liquid has some uses. In Amazônia, when this liquid is yellowy and is squeezed from dry, grated manioc roots, it may be used to make a sauce known as *tucupí*. This happens once the fine starch sediment has settled and the liquid has been removed. The sediment must be boiled for 10-15 minutes at least so as to remove the toxins before peppers, *jambu* leaves (*Wulffia stenoglossa)* and other seasonings are added. *Tucupí* was not known to my Bahian informants and is not used in Bahian cooking. A very few of my informants in Pará mentioned to me that they use this as an insecticide to protect beans from ants – but this usage was not widespread. A very few other farmers in Capim and in Bahia used the liquid with considerable success as a general fertiliser and soil improver, once it had become stagnant in the heat of the sun and had been standing for a minimum of about a week. In one place in Inhambupe and in another near Quaraçú, farmers showed me that certain crops such as water melons grew very large close to where the *manipuera* soaked away from their *casas de farinha*.

However, the examples given above of the productive use of this waste product are exceptions to the general practice of all farmers whom I encountered both in Pará and Bahia. Small farmers, making *farinha* in small or medium-sized *casas de farinha*, more often than not channelled the liquid a short way away from the *casa de farinha* into nearby waste

ground. In some such places, where a small, black, stagnant pool accumulated, it was simply left to evaporate. Yet the pool was always present and occasionally presented a hazard for children and farm animals. Only in one *casa de rodo* in a community near Quaraçú did I observe one such pool carefully positioned a good way from the *casa de farinha* and surrounded by a barbed wire fence. The larger the *farinha*-making establishment, the more serious was the problem. In Campinhos and Simão, which are the suburbs of Conquista where *farinha*, starch and *biscoitos* are made, the large lakes are considered a public health hazard although local researchers are unaware of any detailed public health studies that have been undertaken. (Santos *et al*., 2001)

Researchers at the local University, the State University of SW Bahia (UESB), and staff at an NGO with close links to local government had been investigating the application of the research findings of the University of Brasília, where bio-gas has been generated from this waste water. However, it appears that this technology would only be applicable on a small scale. The practice that a large factory in Paraná State adopted to clean up this waste is outlined in Appendix 5. It remains for local researchers and local government to investigate the applicability of this type of technology, using both micro organisms and aquatic plants, in the particular environment of SW Bahia.

The enormous economic and other pressures - as well as the opportunities - of the 21st century are obliging manioc farmers and *farinha*-makers to adapt their relationship with their subsistence crop. Depending on the scale of the operation, these same pressures are also bringing about changes in social organisation both within these farming families and within rural societies and the wider economy. As we have seen above, the 'modernisation' or technological improvement of manioc processing 'industries', on however small a scale, is also impacting on the natural environment. Apart from the hazard created by waste water generated in *farinha* production, there is the problem of timber depletion. The more 'modern' the enterprise and the greater the amount of production the more firewood is required for the *forno.* In all but the Bacá field research site, where timber was plentiful at least in the immediate area, the depletion of timber in the local or regional environment has already been identified as a significant environmental problem. [10]

[10] The large-scale industrial producer of manioc starch in Paraná whom I visited was also using timber as a fuel to heat air for the drying of the starch. This manufacturer was bringing timber from many hundreds of kilometres away, in Mato Grosso, as local supplies were no longer available.

Technical change and the scale of enterprises

The reasons for and the impact of technological change vary according to scale and the destination of the food product, whether this is primarily for domestic consumption, for domestic consumption and for sale, or entirely for sale in nearby or distant markets. Both the mode and the relations of production vary according to the type of place, whether it be a 'tiny place', a 'small scale, family-run business or a small-scale rural industry.

Tiny places

These tiny places are adjacent to people's homes, sometimes in the backyard, and are to be found in all four case study sites. They are where a woman, with help from her family, makes *farinha* and other foods. In Bacá *farinha* is commonly made in a small construction which is little more than a shelter on the edge of the *roça* where this is far from the house (see Appendix 4B). These different places are where *farinha* is produced for domestic consumption although small amounts of produce might be sold to raise some cash either regularly throughout the year or just occasionally. The products of starch and starch-based foods in these places are only very rarely for sale. Starch, when produced in the *casa de farinha*, is frequently taken into the home kitchen to be converted into food, whether this be *biscoito* or various gruels, cakes or drinks. Only *beijú* is produced within the space of the *casa de farinha*, on the *forno*. Manual and sometimes very ancient techniques and technologies are employed.

I observed examples of these places more frequently in the Pará sites than in the ones in Bahia. The category of tiny places includes all *retiros* in Bacá, some *retiros* of *Paraenses* in Capim, some *casas de rodo* in a very few homes in the Quaraçú area and only one *casa de farinha* in the home of an elderly couple near to Alagoinhas in that field study area. Where *farinha* is produced in this way the proprietors are active farmers growing their own manioc.

In tiny places technological changes are brought about gradually by tinkering around with equipment and taking advantage of the availability of industrially manufactured products or materials where circumstances permit. The farmers remain in control of the process of production since they require only very simple goods and services from outside.

These gradual changes in technology include, for example: the introduction of copper and later iron *fornos* for *farinha*-making (replacing ancient stone or ceramic *fornos*); the wooden press (replacing the traditional *tipití*) the ready availability of plastic receptacles ranging from margarine buckets, that were used in the Pará sites, to the plastic barrels used to collect

starch in Alagoinhas, Crisópolis and Inhambupe (BA) that had been adapted to replace baskets and clay or ceramic containers. The apparent sudden arrival of a type of metal oven to replace the older clay ovens once used for baking *biscoito*s and cakes in SW Bahia also represented a significant change in this region. It was difficult to pinpoint the reasons for the adoption of this type of equipment within the *casa de farinha* everywhere and, in the case of ovens, in the rural homes in SW Bahia. The most likely explanation is that metalworkers and blacksmiths began to experiment with their own inventions to improve the process of *farinha*-making and *biscoito*-baking. Traders also began to offer these items in the small towns and villages of the rural interior and local farmers were disposed to try them out, possibly with a little disposable cash or surplus produce with which they could barter. Kisbán's study of changes in cooking ranges and places of cooking in Hungary throws some light on how a process of small-scale rural industrialisation impacts on the domestic economy. (Kisbán, 1998)

These sorts of limited changes do not alter the social relations within the household, which is the place of food manufacture, although they do slightly reduce the total amount of labour that is required to produce a given amount of the finished product. A more significant consequence of the adoption of these industrially manufactured items into the home industry is to begin to bind the farmer into a capitalist market. The food-maker develops a dependency on the 'new' technology, thus needing to purchase items in the market place. Also a new type of service relationship is established for the farmer who uses a metal *forno* since he now needs the services of an urban-based blacksmith to repair it from time to time, whereas previously he was self-sufficient. Moreover, the metal *forno* requires more timber to fuel it than does the old stone *forno* or clay griddle. There is a corresponding increased demand on local fire-wood resources.

The improvements in the production and distribution process are only slight. In the case of the adoption of the copper and iron *fornos*, which are larger than their clay or stone predecessors, the change has enabled farmers to produce a greater quantity of good quality *farinha*. The ubiquitous margarine buckets must be purchased and are regarded as more convenient receptacles than are the ancient *aturá* (or basket) [11] for storing *farinha* for domestic use and for transporting it small distances, sometimes to a very local market. The nylon sack can be used for larger quantities but the image of the banana leaf-lined *aturá* replete with *farinha* that is on the *escudo* or municipal symbol of São Domingos do Capim has already receded into an idealised past fit now only for the museum.

[11] The *atura* is only known in the Pará case study sites

Small-scale, family-run businesses

This type of business is not present in Gurupá, only in the other three case study sites. In these businesses *farinha* is produced both for domestic consumption and for the market but at this level the motivation and drive to produce for the market has overtaken the absolute need to produce for domestic consumption. A social and economic transformation is instigated in the community whenever such a *casa de farinha* is established. Here the proprietor is usually a man who works with his family and frequently employs some outside help, who typically are women who peel or scrape the manioc and a young man who works on the *forno* - the *forneiro*. The techniques and technologies used are a mixture of the old and the more advanced. The minimum technological advance in this type of business is the inclusion of a motorised grater. The proprietors of many such *casas de farinha* in Bahia had invested in a motorised *forno* as well. The families running this type of business, while continuing to farm their own manioc, were also frequently purchasing roots from neighbouring farms.

The process of specialisation had commenced. It is common for proprietors to 'rent' the use of the *casa de farinha* to neighbours or to lend it to other members of their family for them to make their own *farinha*. The proprietors will work with their neighbours to make the *farinha* and are compensated usually in kind but occasionally in cash. This type of *casa de farinha* was not uncommon in Capim and was common in and around Quaraçú. In the Quaraçú area I visited two co-operative *ca' de rodo* which appeared to be functioning well and to be providing a service for the rural community. This type of business could also be found, albeit in smaller numbers, in the Alagoinhas area. They provided an important service for the communities since many families in this area had been forced to abandon their *casas de farinha* as uneconomical.

Once a family has established a small-scale business with the purpose of trading food products the social relationships within the household begin to change and the relationship of the family towards the market also changes. Where *farinha* is the product it is usual for the male farmer to take control of the business from the woman who normally controls the domestic *farinha* production process in tiny places. In contrast, there seems to have been no gender shift in control in the *beijú* and starch making enterprises in the Alagoinhas area where those in charge of the enterprises were mainly women. For small-scale enterprises this continuity is because the making of starch and starch products occurs in a woman's domain, in the domestic sphere where men either have no access to the process or - if they do share in the work - are still not in control. On the other hand, *farinha*-making, whether it is a man or a woman who controls the process, does involve male as well as female labour.

A distinct shift in attitudes towards both the product and the wider community is taking place. Some rural families are beginning to develop a specialism in the production of food, frequently after they have upgraded their equipment. They therefore begin to distance themselves from farming. This is not universally the case but there is a distinct tendency for the more highly capitalised producers and for those most tied in to the market to begin to move away from farming. As much family labour as can be made available is used in these small enterprises, and it was still common in all four case study sites for the *casa de farinha* everywhere or for the starch workshops in the Alagoinhas area to be a hub of family interchange and collective endeavour. However, these families are already beginning to be seen as specialist *farinha* or *beijú*/starch-makers and are beginning to be motivated by their need to earn cash from the sale of their produce.

The critical needs of such a business differ greatly from the needs of a small-scale home 'industry'. These different needs are:

- Capitalisation of the business – e.g. acquiring machinery for grating the manioc roots and for stirring the *farinha* on the *forno* in the first instance.
- Fuel and/or electrical power to drive this machinery.[12]
- The employment of labour, including sometimes a specialist *forneiro* when there is no mechanised *forno*.
- The need to purchase some manioc roots from other farmers.
- A good supply of clean water is also a felt need for many makers of starch whose work is greatly facilitated by the availability of running water.

The small farmer has no control over the availability of electrical power or running water but, where these services do happen to be available, he/she may or may not choose to use them in the process of food production. When this choice is available, along with other opportunities to purchase 'modern' equipment, employ labour and acquire manioc roots from others, the farmer has an enhanced degree of control over the production process.

In a number of locations in both Pará and Bahia external authorities, projects or farmers' associations - with assistance from external finance - had established cooperative or collective *casas de farinha*. The success or otherwise of these community projects varied greatly depending on the community and external economic and social environment but unfortunately it is not at all uncommon in rural Brazil to find the shell of a community *casa de farinha* that had been constructed and even partially equipped and yet abandoned. In just

[12] Note that some machinery, such as graters, are fuelled by diesel.

the same way other rural areas in the developing world may be littered with abandoned health posts and other such capital infrastructure. This type of development failure, if it is not the result of dishonest practices, is frequently the result of ineffectual project planning that sometimes has involved inappropriate types of local consultation or participative planning which exclude women. Such mistaken forms of project planning also fail to take into consideration the central role and motivations of the extended family unit in rural *farinha* production which rarely coincides exactly with the market-orientation of most rural development projects.

Although it would be unacceptable for me to name these *casas de farinha*, one such place, in a community in Pará, was effectively being run by one of the elite families in the community for their own personal gain. Another, in a Bahian community, stood quite empty and unused. In both communities *farinha* was being made for domestic consumption in individual tiny places quite satisfactorily. Exceptions to this scenario were to be found in Quaraçú and in at least one of the surrounding communities where lively, well administered cooperative *casas de farinha* were providing a service for which the demand was high. Although it was beyond the scope of my research to probe into the detailed history and the administrative records, it was interesting to note that these successful cooperative places operated in economic environments with the following characteristics.

- A number of small rural industries (larger than these small-scale family run businesses) produced *farinha* in Quaraçú and employed fairly large numbers of female manioc scrapers and peelers, resulting in limited female availability to produce *farinha* in a domestic environment.
- There are still a fairly high number of landless farmers who grow manioc on the land of others and who are sharecroppers. These farmers are usually among the poorest and would not normally be in a position to invest in the capital equipment necessary to establish their own family-run business or to qualify for a loan for such investment.
- The family-run businesses in the area felt pressure to produce large quantities of *farinha* for the market and, in many cases, had little or no available capacity to 'rent' out to poorer neighbours.

Rural industries

These industries produce *farinha* for the local and regional markets. In this type of industry the proprietor is a local man whose wife and older children sometimes, but not always, work in the factory. Male labourers and more skilled workers are employed for all tasks except peeling and scraping the roots, which is considered to be predominantly female work. The

industries use regional state-of-the-art machinery for all possible functions, sometimes including the washing of the roots. Several proprietors introduce innovations and adapt their equipment and machinery according to their particular requirements. Some proprietors own their own trucks which are used for bringing in manioc roots to the factory and sometimes for transporting *farinha* to regional markets. Some of these rural industrialists also own land that is farmed but they are rarely hands-on farmers, preferring to employ someone else to farm unless a son or another male relative assumes this responsibility. Because of the scale of production they need to purchase manioc roots, sometimes from quite far afield. There were nine such industries in the town of Quaraçú and one co-operatively-run industry of this kind in the town of Inhambupe that had failed and was closed down in the late 1990s. No such industries existed in the Pará case study areas although there are such industries in Iritua to the west of Capim (see Figueiredo, 2000).

Although the presence of such industries impacts on local family farmers, the farmers do not manage them. They are outside their realm and thus beyond the scope of this research. Yet these industries, where they exist, are both economically and socially significant within rural society and they merit further study. The industries provide local employment. These are industries that technologically emulate and adapt traditional production techniques and are therefore much closer to small-scale family run businesses than they are, for example, to the sophisticated modern factories in the State of Paraná in Southern Brazil. Paraná and other starch and *farinha* manufacturers in Southern Brazil, which are grouped in the Brazilian Association of Starch Producers (ABAM), function in a separate world and follow the logic of dynamic, innovative big business operating in - or aspiring to operate in - a global market. (see ABAM, 1999 and website)

Labour: availability and vulnerability

Just as they operate on the margins of the formal economy, so the small family-run enterprises still operate *de facto* outside the ordinary legislation that applies to manufacturing industry. The proprietors of the *casa de farinha* or starch workshop employ labour according to very localised criteria that include the availability of labourers - which cannot be taken for granted. [13] Usually the *forneiro*, a specialist worker, receives the equivalent of a

[13] In one location in the Bragantina area of Pará, I visited a rural enterprise making *farinha* where labourers were trucked in from elsewhere in the region. The men worked as 'indented labourers' for a period of time, returning home with very little money because their accommodation, food, drink (including alcohol) and cigarettes were deducted from their pay. However, these conditions of debt bondage did not prevail in any of my case-study areas.

minimum daily wage. [14] Yet his hours of work are exceedingly long. Fourteen-hour days are not uncommon, especially in Capim and SW Bahia. However, these workers cannot always count on regular work throughout the year so their weekly or monthly income remains inferior to the national minimum wage. Other workers - men, women and children - are commonly employed by farming families and by older farmers who are receiving a retirement pension to undertake all kinds of work in the fields and around the *casa de farinha*. These workers are usually paid a daily wage below the legally established minimum wage. Children often help their mothers to peel and scrape manioc and to do other odd-jobs around the *casa de farinha* but they are not paid.

Labourers working in this type of occupation in the case-study areas are normally entitled to join the rural workers' union (the STR). In this way they become eligible for social security benefits such as maternity pay, health care and a retirement pension. The STR accepts as members those workers who work on the land. Usually those who are employed in *farinha* or starch making are regarded as being close enough to the land to be eligible. The proprietor of one relatively large rural enterprise in Quaraçú informed me that the women whom he employed nearly full time to peel and scrape manioc were entitled to joint the STR. However, as I later learnt, they chose not to. Thus *de facto* they relinquished their rights to social security since rural enterprises do not offer workers their *carteira assinada*, or legally recognised employment. This seems to have been because the workers felt that their *patrão* looked after them but it was also because the employer entails costs and responsibilities when he employs workers with their *carteira assinada.*[15]

Along with insecure and intermittent employment, long hours and low pay, the prevalence of avoidable accidents is another sign of the vulnerability of workers in food production. Accidents with machinery are fairly common in mechanised *casas de farinha*, and much more so in Bahia than even in Capim, Pará. This may be because of the greater pressures on the employed workers and others in Bahia to produce for the market. There is another reason. Most of the workers in *farinheiras* in the Quaraçú area and in *casas de farinha* in some parts of the Alagoinhas area, although they have no financial stake in the small enterprise, nevertheless seem to perceive the workplace to be a 'family' place and to think of their employer as a patron, although more often than not these places are being run for profit by an entrepreneur. Children are not warned to keep away from dangerous machinery, and

[14] The minimum national monthly wage in 2002 was $R200 - about £50.
[15] In the areas of rural Brazil where I conducted my research I rarely encountered anyone - neither local government employees, nurses, health agents, teachers nor others - with their *carteira assinada*. Thus these rural enterprises were not an exception to the local *modus vivendum*.

adult workers take risks. Many of the mothers of children in the Quaraçú crèche, all of whom were workers in the *farinheiras*, mentioned to me that one of their children had lost one or more fingers. In another place I was told of an accident in which the long hair of a little girl had become entangled in the grater and she had been killed. Proprietors of small businesses are usually aware that it is illegal for them to employ children. The issue is sensitive - and not only for the employers - because it relates to local livelihoods and to a wide and fatalistic acceptance by workers of the risks. Yet the injuries and occasional deaths keep on happening and it is urgent that there should be further study on how to prevent such accidents.

Outsiders to the rural environment in Bahia, in particular technical staff from EMBRAPA-CNPMF, regularly express their concern about the lack of hygiene in the artesanal manufacture of *farinha*, *biscoito*s and *beijú.* This was not an issue in the Paraense case study sites as the small-scale *casas de farinha* are geographically located well out of sight of the outsider in Capim and the level of trade in Bacá is insignificant and attracts no attention of this kind. However, families who make these products for distribution within the extended family and the community and for sale in a local or regional market are rarely aware of issues of hygiene any more than are the intermediaries who purchase the products or the great majority of the ultimate consumers. Only middle class urban people have ever expressed their concern to me about the issue of hygiene in the rural places of manioc food production. I heard no stories about food poisoning from such products, although some studies do show the degree of impurities that exist in rurally produced foods. [16]

CONCLUSION

On numerous occasions during my fieldwork, rural men and women emphasised to me that manioc was all that they had. By this, they meant both that it was their sustenance and their subsistence and also that it was an important source of income for them. It is a central aspect of life and work over which rural people have had a high degree of control. In the view of most of my informants, there would be no life without manioc in the *roça* and access to the *casa de farinha* in which to process the crop. The fact that there has been little or no direct external interference in this aspect of rural work means that in most places rural food-makers are confident and successful in what they do. The fact that the techniques and technologies

[16] Although I was unable to find any publications about hygiene in the production of manioc foods, the issue was the subject of discussion and concern among officials from EMBRAPA in particular in relation to production of *farinha* and starch in the communities of Campinhos and Simão in Conquista (BA).

employed to make food may appear to the outsider to be primitive or rustic does not *explain* their poverty as some sophisticated manioc experts would have it. On the contrary. The fact that such appropriate and indigenous technologies are used and that they are enhanced, where possible, by the use of motorised equipment to feed rural people explains any stability that does exist in the rural areas.

In this chapter we have seen that the small farmers are part separate from and part integrated with the larger economy, thus conforming to Wolf's description of them as 'agriculturalists partly integrated into the world economy.' (Wolf, 1966 cited by Eriksen, 2001:203). The analysis of the different levels or places in which manioc foods are produced - the tiny places, small-scale family-run businesses or rural industries - has shown that the shift from subsistence to market-driven production takes place along this continuum, from the ultra small to the relatively large. So also, but to a more limited extent, does the shift from very small-scale but still innovative techniques in the tiny places to the technologies that are used in rural industries. Yet these larger places, which employ labour from outside the family, still rely heavily on adaptations of ancient production techniques and are quite distinct from the sophisticated industrial processes used in Paraná and elsewhere in southern Brazil.

Industrialists, whether from Paraná or from elsewhere in my study areas, might well disagree with this analysis. They are immersed in the technological and scientific revolution of the past 10-15 years which is enabling this sector of the national economy to take great strides forward and to create all kinds of new products for a sophisticated urban and global market. Such products include instant pastas, ready-mix 'typical' foods such as the famous *pão de queijo* and degradable plastics for use in carrier bags and to substitute polystyrene, to mention but some highlights. Although, as we shall see in the next chapter, the Paraná industries produce *farinha* and some starch products which are exported to the north and north-east of the country, the indications are that these industries will not feed the rural farming population - at least not yet. Not, that is, unless and until the forces of modernisation undermine and displace the small-scale producers of manioc and the makers of the huge range of *farinhas* and starch foods which cater for all tastes and keep alive all of the diverse local and regional cultures in the interior of northern and north-eastern Brazil. In the next chapter we will discuss food 'taste' and analyse some of the ways in which farmers distribute and market their manioc and manioc foods which most certainly would amaze the industrialists who live in a world apart from these rural societies.

CHAPTER 8

FOOD CULTURES:
DISTRIBUTION, EXCHANGE AND CONSUMPTION

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FOOD CULTURES: DISTRIBUTION, EXCHANGE AND CONSUMPTION

INTRODUCTION

This chapter brings to a conclusion the analysis of the successive moments in the Manioc Chain. It examines distribution and exchange, and consumption, within the food cultures of the case study areas. As in the previous chapter, which is about the production of manioc-based foods, I focus attention in this chapter on three key foods - *farinha*, *beijú* and *biscoitos*.

I am concerned here not only with objective analysis but also with subjectivities, with the meanings that rural people ascribe to the consumption of *farinha* as the staple food and of the two starch-foods, *beijú* and *biscoitos*. These meanings vary depending on a number of factors: the particular geographical area, peoples' relationship to the means of production, and the extent to which local food cultures remain buoyant and closely intertwined with agri-culture. The food cultures are a central subject of this chapter.

Once produced, *farinha* and the other foods are then distributed**,** in the first place to meet the consumption needs of the producer's family and obligations of reciprocity. The surplus production, whether in roots or in locally processed foods, is then sold to intermediaries or to consumers in different types of market, whether near or distant. These distribution processes in effect regulate the production decisions that are made by the farmers.

We find that particular types of food are intimately bound up in social and cultural identities. People's experience of and recollections of aspects of food are as diverse as taste and occasion, scarcity and plenty. They are embedded in local unwritten and privately communicated histories. The reflections in this chapter on the consumption of manioc foods are a narrative of the everyday, mainly informed by conversations with women. They reveal significant distinctions both between manioc and other food products and between the different manioc-based food products, in terms both of the social prestige attaching to and the intrinsic qualities of the various foods.

I introduce the chapter with a discussion of some of the literature on food cultures and consumption. The discussion also embraces issues of direct relevance to the distribution and exchange of manioc and the trading of products through the market.

PART 1

CULTURES OF CONSUMPTION

Maurice Bloch has provided a succinct definition of culture as 'that which needs to be known in order to be able to operate reasonably effectively in a specific human environment' (Bloch, 1991). But manioc food culture is more than this. One of the most powerful definitions of local food culture of direct relevance to this study of a staple food is offered by Bourdieu when he equates the 'taste of necessity' with the 'taste of freedom' (1999a:195). The necessary foods – as well as the knowledge and know-how to produce, distribute, consume, enjoy and remember them – involve people's creativity and constitute food culture in the study areas and the capacity of these communities for social reproduction.

Much recent thinking on food and commodity chains has been inspired by two developments. The first is in response to the demand in Western Europe and the US for organic, locally sourced foods to counter the hegemony of multinational food corporations.[1] The other is the drive to understand the ever expanding multicultural consumerism of the metropolitan countries – notably in Western Europe. Themes such as tensions between the local and the global, issues of identity, home and migration and the behaviour of consumers permeate academic agendas. The main focus in contemporary debates is on 'modern' as opposed to 'non modern' societies and communities. (see discussion of Miller below).

Alan Warde defends his materialist approach to food culture and consumption and makes a distinction between this and a different approach in which 'signs, discourses and mental constructs' play an 'exclusive role in understanding social activity'. There has been a shift in the intellectual emphasis from scarcity to affluence. As Warde says:

[1] See Belasco, 2005 for an account of food and the counterculture in the USA of the 1960s and 70s. The British Economic and Social Science Research Council (ESRC) with the Arts and Humanities Research Council (AHRC) is currently funding a large research programme on the 'Cultures of Consumption', an important aspect of which is concerned with 'alternative food networks'. This follows the earlier ESRC 'Transnational Communities Programme' which sponsored the work of several of the most vocal academics involved in discussions on food culture and commodity flows in which Philip Crang, Claire Dwyer and Peter Jackson played an important role.

> 'This shift entailed a radical change of substantive focus from the shop floor to the theme park, from labouring to shopping, from class to lifestyle, from resources to images, from practice to interpretation, from production to consumption'. (Warde, 1997).

The shift in emphasis also includes the 'collapse of space and time' that is alluded to by Urry (1995). The researchers to whom Warde alludes make their argument with a 'first world' focus where the consumer of a 'commodity', whether the item be clothing or food, is *not* the producer. Cook and Crang, (1996) note that the '…displacement of commodities from worlds of production into worlds of consumption produces a vacuum of meaning and knowledge to be filled'. The present study stands in contrast to this work because the producers *are* very frequently the consumers. This factor shapes the local cultural meanings of the manioc foods that are shared by producers and consumers.

Over the last couple of decades, anthropologists, sociologists and human geographers have radically changed the manner in which distribution/exchange and, in particular, the consumption of commodities had previously been theorised. We will look at some of the implications of this and of other thinking for my work but first I recall an earlier discussion.

As seen in chapter 2, part 3, the sequence of production-distribution and exchange-consumption continues to resonate with people's experience of foods not only in rural Brazilian communities but also in the then contemporary French society that Pierre Bourdieu reported upon at the end of the 1970s. As he pointed out, the meanings that consumers attach to 'articles' of whatever kind are the product of an interaction that is cultural and thereby social in character. He asserts that the researcher has to establish

> "…the relationship between an object defined by the possibilities and impossibilities it offers, which are only revealed in the world of social uses … and the dispositions of an agent or class of agents, that is, the schemes of perception, appreciation and action which constitute its objective utility in a practical usage." (Bourdieu, 1984:100)

As with other commodities, the consumption of food is class related.[2] As discussed in Chapter 2, the experience of consuming food, both at the time of the meal and later as it is

[2] Daniel Miller recognised that '…the study of consumption and commodities represents a major transformation in the discipline of anthropology' (1995c). He defined the term 'consumption' as the consumption of commodities and not of 'non-commodified goods' while highlighting the significance of the commodity as an embodiment of 'material culture'. Non-commodified goods are essentially those goods and services that have not been purchased and one of Miller's definitions of consumption is the result of a process '…through which people rely increasingly upon goods that they do not themselves produce…' (*op. cit.:*154*)* Where the consumers of manioc foods in this study are also the producers of those foods, then the relationship between producer and consumer/eater – and the distribution of these products within the family and community - would fall outside the definitions used by Miller.

recalled thorough memory, is both sensory and, when it is shared with others, social. As is explained by Sutton, this kind of sharing is enabled not only by words, whether spoken or written, but by other senses as well, notably taste and smell. (Sutton, 2001) Ian Cook also tells of taste and smell in his narratives about Jamaican 'tropical' foods in both Jamaica and London (Cook, 2004a & b). The significance of sensory experience for manioc consumers is that it is remembered and conveyed to kin as an integral element in the Manioc Chain.

Daniel Miller's conceptualisation of the local-global dichotomy in his work on modernity illuminates the local-regional and rural-urban dimensions of the present study. (Miller, 1994). He refers to 'non modern cultures'[3] that he distinguishes from those of contemporary Western Europe (by which we might also read urban Brazil), yet his intellectual curiosity is aroused by the challenge to move

> '…the debate over modernity from the specific trajectory of European traditions to the very distinct development of human societies in areas such as Japan or Brazil and examine key questions as to the balance between global transformations with homogenising consequences as against the localising of new commodities by the particularity given them within specific social and historic contexts. (Miller, 1994:68*)*

The present study engages not with a new but with an ancient food product. However, this food is sometimes commodified and sold not only in local but also in distant regional markets while always being available in a huge diversity of forms. The manner in which manioc foods are constructed in specific social and historic contexts and in local as well as regional markets is explored in this chapter. This exploration is intended to contribute to a growing body of empirical work about commodities and social life.

Two other themes within the contemporary debate about food globalisation resonate with aspects of my findings. The first theme refers to migration and exile and to the significance of local food cultures for those who migrate. The second interconnecting theme is about food, identity and home. (e.g., Cook, 2004a & b, Kneafsey and Cox, 2002, Sutton, 2001, Crang 1996 and Counihan 1984). Empirical findings concerning the households of the manioc farmers are presented in part 3 of this chapter.

The diaspora within Brazil – both the permanent and the seasonal shift of millions of rural people to metropolitan areas – has been going on over the last 40 years or even longer. The farmers/food producers of this study know that their urban relatives desire the familiar foods of their home areas, whether this be a particular quality of *farinha* or a home-baked *biscoito*.

[3] Here he makes reference to classical anthropological studies of, for example, Melanesian society. In a Brazilian context, ethnographies of indigenous people would fall into this category.

As we shall see in part 3 of this chapter, their understanding of the continuing attraction to urban migrants of the remembered foods of home informs the marketing strategies of the producers in the Alagoinhas area as they sell particular types of starch foods in the markets of Salvador. Food preferences can be closely linked to the assertion of identities, as Kneafsey and Cox (2002) conclude in their study on Irishness in England:

> 'This research suggests that food consumption practices can help to reflect and constitute Irishness. People choose particular foods both because they are Irish and they know those foods from home, and because they want to restate that Irishness, usually within the domestic sphere of the home.'

These observations, however, come with a warning. What consumers in urban markets think about these foods was not a research objective although I did examine the perceptions of manioc food products amongst the local producers *qua* consumers/eaters. Research among urban consumers of manioc foods – who sometimes are the relatives and clients of the local farmers/food producers – would provide a fascinating complement to this study.

PART 2

DISTRIBUTION AND EXCHANGE

As we noted in Chapter 2, distribution is the bridge between production and exchange. Marx precisely defines the relationship between production, distribution, exchange and consumption:

> 'Production creates articles corresponding to requirements; distribution allocates them according to social laws; exchange in its turn distributes the goods, which have already been allocated, in conformity with individual needs; finally, in consumption the product leaves this social movement, it becomes the direct object and servant of an individual need, which its use satisfies….
>
> Distribution determines the proportion (the quantity) of the products accruing to the individual, exchange determines the products in which the individual claims to make up the share assigned to him by distribution.
>
> '…it seems that distribution is not regulated and determined by production but, on the contrary, production by distribution.' (Marx, 1859: Extract from Appendix 1)

The relationship with production

The quantity of manioc and manioc foods available to family farmers depends on a range of variables, most of which could only be quantified in a very different kind of study from this one. For example, a family with more or better land or greater farming expertise might be producing a greater quantity of the crop. Where the family can count on a little income from other work or pension payments, they might be in a position to pay labourers to clear *roças*, weed and eventually harvest. In such cases the family farm will be providing manioc both for family consumption and for the market.

Distribution of the manioc-based foods changes when a farmer adopts 'modern' technologies in farming and abandons the production of food. There may come a point in the equation when a farmer ceases to produce food as such and starts to provide fresh roots for the market. At this point, the farmer's manioc crop is *distributed* to industry by means of exchange, but if this decision applies to all or most of the production the food-stuff may no longer be available for family consumption. I met a very few farmers in the Alagoinhas region, in particular in Crisópolis, where one particular variety of manioc had been adopted by some because it produces a high yield. They lamented that occasionally they were obliged to buy *farinha.* The product had become a commodity in a market over which the farmer no longer had control. This situation had arisen because the farmers had been able to make a good price from selling their crop of the high yielding manioc which they had grown with fertilizers and with the help of pesticides. These farmers remained extremely vulnerable to disease or pest infection in their crop as they did not have the resources available to large land-owners. Yet the farmers' labour and their capital investments were contributing to meet an important local and regional demand. Their entire crop had been *exchanged* and none had been retained for family consumption. The farmers might gain from opportunities that they found through the market - or they might lose. The point is that they had become vulnerable to 'market forces' and to the possible negative effects of adopting a system of quasi-monoculture in their agriculture. Distribution of the crop and of the associated food products, through the market, regulates the farmers' production, just as Marx explained.

The consequences can be seen in the rural communities. There are, for example, those farmers who have abandoned food production or, rather, manioc processing. In Quaraçú, where there are many 'rural industries' producing *farinha*, the women who are employed to peel or scrape the root no longer process manioc on their own family farms. But they do still '*earn' farinha.* They not only earn at least a minimum wage, or more, but they are also part paid, in kind. Each week the proprietor of one *farinheira* was giving his workers 8 kgs. of *farinha.* Thus the mode of distribution of *farinha* in Quaraçú has been transformed from an earlier time when the *farinheiras* did not exist.

Distribution of food within the family - and gifts

Marx (*op. cit.*) notes that 'articles' are distributed according to 'social laws'. His analysis applies to the manner in which manioc and its products - notably *farinha* as the staple food – are distributed *within* the family. 'Social laws' do indeed apply. Still, among many,

probably most, families in the Pará case study areas and a significant proportion of farmer-producers in Bahia, these 'social laws' or cultural norms are scarcely under stress despite changes in production and exchange practices over the past couple of decades. The 'social laws', that are ones of reciprocity, afford an absolute priority to the provision for the family of sufficient quantity of quality food (*farinha, beijú* and *biscoitos* to use the examples from this study). The needs of the family are paramount in as much as distribution customs and practice are concerned.

These 'social laws' affect the distribution of manioc products within the family and extend beyond to kin and community. As indicated in previous chapters, two of the most important products of manioc are not customarily sold within the community. Although they are not exchanged on the market they may be distributed in other ways. The first of these products is the very planting material - the manioc sticks that are equivalent to the seed in other types of crop - without which there could be no next crop and therefore no social reproduction of the society. The second of these products is the basic and indispensable food of these societies, *farinha*.

Another manioc food product, which does not require processing before eating, is 'sweet' manioc - *macaxeira, aipim* or *mandioca mansa* - which only requires boiling or cooking in other simple ways. This also is rarely sold and this is not just because it is difficult for most family farmers to transport the roots to local markets within the 24-48 hour period before it begins to rot. As we saw in Chapter 6, 'sweet' manioc is perceived as a woman's crop and one over which she has control and uses to provide immediate food for her family. This product is very frequently given to family, friends and neighbours but it is a food that is rarely sold.

Women farmers, and a few men, occasionally told me how sad they were that they had been obliged to buy *farinha* in certain times of shortage. These same people, and others as well, told me that they found it inconceivable not to give *farinha* or planting material to family and neighbours if they were in need. Whenever I found exceptions to this deeply felt practice, I also found that the reason lay in external pressures. These were usually ones of economic necessity. Land-grabbing in Capim, for example, or the myriad of other pressures that were forcing farmers off their land in the Bahia sites were undermining those very 'social laws' that underpinned the coherence, solidarity *and* adaptability of rural society. The customary 'social laws', or cultural practices, in these few cases, were gradually beginning to break down and to be replaced by the imperatives of the dominant capitalist society.

Trading in manioc foods

In this part of the chapter I assess developments in the trading of manioc products as produced by family farmers in my case study areas. Most of the trading in all four areas is in *farinha.* However, I will highlight both the areas where the trading in fresh roots is significant and the reasons why this should be so. In contrast, I will be drawing a distinction between this type of trading and the growing market for starch-based food products, mainly - although not exclusively - of *beijú* and *biscoitos*, in the four areas. Finally, I discuss the impact of modernisation on the manufacture of *farinha* and the implications of recent changes in these markets for the future of the maintenance of agrobiodiversity in manioc as managed by family farmers. First, however, I consider the macro-economic context.

Markets and agricultural modernisation in Brazil

In Chapter 2, we distinguished between the 'formalist' and the 'substantive' or 'real' concepts of the economy. It is the substantive position that recognises how economic behaviour is embedded in local cultures and that enables us to understand and to explain the *habitus* and the real world practices of small farmers. Yet it is the kind of economic theory and prescription characterised by the formalist position that enshrines market forces and that has driven and legitimised the process of top-down agricultural modernisation in Brazil.[4] Like other countries, Brazil since the mid-1960s has seen the growth of a specialised agricultural sector that has concentrated on a few uniform crop varieties that need external inputs, notably chemical fertilizers and pesticides, and that then deliver high yields - measured by input/output ratios. The Brazilian economy underwent profound structural changes after the Second World War but it was only from the mid-1960s onwards that the process of industrialisation began to accelerate rapidly and to overtake agriculture.[5] In parallel, the urban population began to rise, eventually to overtake the rural population. Agricultural modernisation included, in the Amazon, the expansion of the agricultural frontier with all its consequences. The accompanying urbanisation of the population took

[4] It has to be admitted that the formalist position is very influential. As we have seen at various places in this study, this position is inscribed in the practice of many agricultural scientists, in Brazil as elsewhere, as they advocate the presumed market benefits to farmers of maximising their incomes by cultivating just the few high-yield varieties. This system creates winners but it also creates losers.

[5] A World Bank Report summarises the patterns of agricultural growth and accompanying policy adjustments succinctly. The report records that the percentage contribution of agriculture to Brazil's GDP fell from 17.8% in 1961 to 10% in 1990. (World Bank, 1994) There is, of course, nothing new in rural economies being re-ordered by external intervention towards production of cash crops for export. This happened, for example, during the nineteenth and twentieth centuries in British West African colonies and in British India. What is new is the alliance from the 1960s onwards - between science, governments and agribusiness - and the creation of new breeds of high-yield crop plants. (Brookfield, 2001: 218-9)

place later than in southern Brazil in the states of Pará and Bahia. In these states the urban population only overtook the rural during the decade of the 1980s.

The plant-breeding agricultural technologies that were developed and promoted at an accelerating rate from the 1960s onwards brought about the so-called 'Green Revolution' in tropical agriculture. [6] In Brazil, as we noted in Chapter 1, the effect has been largely negative in terms of both ecological and social justice criteria (Goodman and Hall, 1990 and Hecht and Cockburn, 1990). In recent decades agricultural modernization has included, in the Amazon and elsewhere, the expansion of the agricultural frontier with all its negative consequences. Brazil has experienced a capital intensive form of farming, one that is oriented very largely towards export and that is reliant on mechanical and chemical inputs and now, increasingly, on biotechnology. There is a significant involvement of the transnationals. The consequences have been more beneficial to rich than they have been to poorer farmers, while food security, dependent as this is on manioc and other staple crops, has been compromised during a period of rapid population growth. Manioc had achieved a high production point in Brazil of over 29 million tons in 1970. Since then it has slipped back even as the population has rapidly mounted from 93 million in 1970 to 164 million in 1997.[7] A study of smallholders and structural change in the Brazilian economy highlighted what was happening at the time when the Green Revolution was making a major impact.

> '… the advance of agriculture … was very far from uniform… Over the 1975-86 period domestic per capita food production declined for beans, cassava and maize, stagnated in rice, and marked secure gains only in wheat … in the absence of major subsidies for wheat producers, the per capita domestic availability of calories would have declined significantly in the 1970s.' (Howe and Goodman, 1992)

This global technological dominance by the transnationals is matched by their increasing market dominance of food commodity markets.

> 'Concentration is common in the food system. For instance, Cargill, a family-owned commodity trader, has 60% of the world cereal trade. The five biggest corporations control 77% of the cereals trade; the biggest three have 80% of the banana market; the top three have 83% of the cocoa market and 85% of the tea trade.' (Lang, 2002:262)

Yet, despite this increasing concentration in the food system, small farmers remain critical to the maintenance of food security - for rural as well as for urban populations. Their

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[6] GRAIN points out that the Green Revolution '… was a prime example of how an effort to 'modernise' can put the very basis of sustainable development at risk, simply by bypassing and undermining local resources, knowledge and experience generated over millennia.' (from GRAIN website 'Agricultural research for whom?' Accessed April 2005)

[7] Production data for Brazil's main food crops from 1940 to 1998 are at Appendix 2E. Data on production, area and yield for 1985 and 1995/96 are at Appendix 2F. The true figures for manioc production would be significantly higher due to under-reporting and non-reporting of production by small farmers and in women's kitchen gardens.

importance is not only in the growing and harvesting of food crops but also in the production of foods. As we saw in Chapter 7, local food processing creates what might be called a dynamic, ever evolving 'food economy' in rural communities. It is clear that small farmers can and often do extend their operations from very local markets to ones that are further away, although in such cases traders and other intermediaries are usually also involved. Amongst other things, this requires extensive trading networks, effective transport systems and reliable supplies to meet a demand that, for a stable food crop such as manioc, is predictable in the short term even if there may be long term changes under pressure from the penetration of other foods.

Trading in the case study areas

In each of the case study areas I observed farmers trading in different ways and managing the agricultural output of their manioc crop, in all its genetic diversity in distinctive ways. In all cases, changes in the quality and availability of rural roads and transport infrastructure have had consequences for the type of trading that is possible. Tables 8-1 to 8-3 present data on the structure of trading in three of the four case study sites, centring trade in Capim, Quaraçú (S.W. Bahia) and the Alagoinhas area. The tables are accompanied by a discussion of aspects of these trading systems in *farinha*, starch foods and roots. The situation of Gurupá, however, is so different from that of the other case study sites that it is discussed separately and requires no illustrative table as we shall see.

Gurupá

As Oliveira (1991), Pace (1998) and others have documented, although Gurupá is distant from urban centres and is not connected to the rest of the country by road links, it nevertheless has been an area of enormous social, political and economic change. It was affected by the huge level of development projects in the Amazon region during the seventies, eighties and nineties. Trading relations had been transformed within the lifetime of many of my informants. This was because there had been radical changes in the patron-client relationship and in the relationship of local rural people with those who have controlled credit and trade with the outside world since the time of the rubber boom in the 19th century. My hostess in Bacá, a lady in her fifties from the *várzea* (floodplain) where little manioc is grown, recalled a system characterised, on the one hand, by barter and exchange and, on the other, by an oppressive patron-client dependency.

> In the time of my father, we used to plant rice, maize, beans everything - and now we buy everything. My mother used to collect lots of eggs, sometimes 100 at a time. She would sell some but most would be exchanged for things like clothes or shoes. The food crops were either sold to the *patrão* or exchanged. Our *farinha* was mainly brought in from Belém. It was very bad - and it came through the *patrão*. (Interview May 2002)

Table 8-1 Structure of *farinha* trading in Capim, Pará

Origin	Pro-duct	Trader 1	Trader 2	Destination	Client
F/P at farm	Fa. in sacks	Trader A takes fa. to Capim port for sale to trader 2. Sacks are weighed in the port by purchaser or agent. Trader A charges farmer for freight by the sack. This trade took place on Thursday and Saturdays during my visit (June 2002)	1. Large number of 'B' traders purchase fa. in Capim port. 2. Significant amount of trade also carried out with 'W' traders.	1. 'B' traders take fa. to Belém. Some traders go further to Mosqueiro and beyond to Marajó and Amapá. (including Gurupá). Some 'B' traders sell on the fa. to a third party in Belém port for onward trading to these other destinations. 2. 'W' traders take fa. to Belém where it is removed to supply some of the large urban markets.	Clients of 'B' traders in Belém are relatively small-scale commercial entrepreneurs or smaller-scale retailers who purchase the product in the port of *Punto Certo* in Belém. These clients ensure quality control by tasting the fa. and then weighing it before purchasing. Some are market stall holders in the Guamã retail market who arrange for the fa. to be pushed on trolleys to the market more than 1km. away.
F/P at farm	Fa. in sacks	A takes fa. direct to Belém by road. Road haulage is therefore more expensive but advantages are: • the fa. arrives to market quickly • it does not have to await the regular twice weekly trading • Only one trader is involved	–	Belém	Probably small-scale enterprises as above – (note 2)
F/P at farm	Fa. in sacks	Some 'B' traders who live on the Rio Capim and who are also local landowners purchase good quality fa. direct from local farmers.	–	Mosqueiro, beyond Belém. Some 'B' traders have family ties in Mosqueiro. The price paid here is said to be higher than in Belém.	Probably small-scale enterprises as above– (note 2)
F/P at farm	Fa. in sacks	No intermediary. Some F/Ps in the south west of the municipality took their produce direct to market by bus in Mãe do Rio.	–	Market in Mãe do Rio toward the west. (Discussed by Figueiredo 2000)	(see Figueiredo 2000) – (note 2)

Key:
F/P - Farmer/Producer of food products (Tiny places and small-scale businesses)
Fa. – *Farinha*
A – *atravessador* – trader with own vehicle
B – Trader with own boat
W – Wholesaler or representative of wholesaler

Note:
1. Capim farmers did not sell their *farinha* in the twice-weekly retail market in town. The urban population either obtained their *farinha* direct from farmers living nearer to the town or rural relatives or, commonly, in small shops in the town.
2. Time restrictions during fieldwork did not permit further investigation of the distribution channels of *farinha* in towns other than Capim and Belém.

Table 8-2 Structure of trading in Quaraçú, Municipality of Cândido Sales, S.W. Bahia

Origin	Product	Trader	Destination	Client
F at farm	Roots	Ind. Proprietors of Quaraçú *farinheiras* purchased direct from farms from quite far afield where necessary. The same men traded roots to Conquista.	*1.* Quaraçú rural industries (*farinheiras)* (end users) 2. Conquista *biscoito* and fa. makers 3. Other destinations are possible when traders from afar travel in search of roots in times of local shortages.	The Conquista *biscoito* and *farinha*-makers are mainly household, family-run small workshops in the neighbourhoods of Campinhos and Simão who supply the Conquista market (see final row of this table)
F/P at farm	Fa. in sacks	Various 'A'-type traders establish relationships with particular farmers from whom they purchase fa. Traders taste the produce before setting the price and paid more for the best quality.	Itabuna and Ilheus (on the Bahian coast). Some trade to Conquista.	(See note 1) Only 2 types of fa. on sale in Quaraçú weekly market being sold by farmers from outside the district of Quaraçú.
Ind.	Fa. in bulk (sacks)	No intermediary. These rural industrialists, with their own vehicles, supply large urban centres with a relatively uniform commodity.	Itabuna and Ilheus (on the Bahian coast). Some trade to Conquista and further away.	Most probably these manufacturers deal with wholesalers yet I was unable to confirm this.
P	*Biscoitos*, starch foods and fa.	No intermediary. Producers tend to own their own small vehicles.	Most of these producers sell their produce in the retail markets of Conquista direct to customers without intermediaries.	Urban customers who use the local markets. Note that these products are difficult to purchase in small towns like Quaraçú. In Quaraçú, *biscoitos* sometimes sold by one woman to another directly.

Key:

F/P Farmer/Producer of food products (Tiny places and small-scale family businesses)
F Farmer (not food producer)
P Producers of *biscoitos* and other starch foods and producers of *farinha* based in Simão and Campinhos, neighbourhoods of Conquista.
Fa. *Farinha*
A *atravessador* - trader with own vehicle
Ind. Rural industry proprietor

Notes:

1. Time restrictions during fieldwork did not permit further investigation of the distribution channels of *farinha* in towns other than Cândido Sales and Conquista. The town of Cândido Sales has a weekly retail market to which *farinha, biscoitos* and other manioc foods are supplied from local areas *other* than Quaraçú. This is no doubt because Quaraçú has such a large concentration of rural industries and also attracts A-type traders referred to in the table.

Table 8-3 Structure of trading in the Alagoinhas region, Bahia

Origin	Product	Trader	Destination	Client
F at farm	Roots	Ind. and A. *Farinha* industries from Sergipe State and the Recôncavo area near Salvador (quite far afield) purchase roots directly from farms as do locally based 'A' type traders.	Large *farinha* factories in Bahia and Sergipe. (Note 1) Also Irará, to the west of Alagoinhas (between Alagoinhas and Feira de Santana) mentioned by Torres Filho, 2002:65, but not by my informants.	(See note 1)
F/P at farm	Fa.	Traders type A	Salvador	W for distribution in Salvador and also direct to large retail markets. (Note 1)
F/P	Fa.	No intermediary. Some local family farmers have their own vehicles.	Alagoinhas Saturday market (and other similar weekly markets in the region) (Note 2)	Fa. sold direct to customers in the market. Prices varied according to a scale of locally perceived quality.
P	*Beijú* and starch foods	No intermediary. Transport might be public although some producers have their own small vehicle.	Many women take starch foods to sell in the large Alagoinhas Friday & Saturday market (and other similar but much smaller weekly markets in the region). Some men carried this produce to Salvador by bus for sale in very small street markets there. (Note 2)	Food products sold direct to customers. NB. there were only 6 stalls selling this produce in Inhambupe market.

Key:

F/P Farmer/Producer of food products (Tiny places and small-scale family businesses)
F Farmer (not food producer)
P Small-scale family producers of *beijú* and a wide range of other starch products – frequently female-run businesses.
Fa. *Farinha*
A *atravessador* – trader with own vehicle
Ind. Rural industry proprietor
W Wholesaler or representative of wholesaler

Notes

1. Both the trading and distribution of *farinha* in Greater Salvador and the supplying of roots to large-scale *farinha* factories in the wider region is a complex process which would merit a separate enquiry. The remarks included here are the results of my direct observations and interviews with small-scale family farmer-producers only and are therefore limited in scope.
2. I was able to visit the Alagoinhas market a few times during fieldwork and the Inhambupe market twice. Because of time restrictions I was not able to visit other much smaller weekly markets in the wider area even though many of my informants did mention them.

The manner in which family farmers can manage agrobiodiversity and change within the Manioc Chain in Gurupá is different from other case study sites. This is because the farmers of my study from the community of Bacá do not sell their produce to intermediaries. Nor do they trade beyond the local town of Gurupá, as we have seen in Chapters 6 and 7. Moreover, the *farinha* imported to the municipality from further south in Pará (including from Capim) presents the Bacá farmers with no competition for their product in the local market. The demand for the *farinha* made in Bacá is high because its taste is very much appreciated locally and because the supply of this quality product is insufficient to meet local demand. Farmers, who themselves produce the *farinha* and some other foods for the market, incur only minimal costs to bring their produce to town. The bus which brings them and their produce to market is free of charge. They only need to invest in containers suitable for the transport of their produce – which are sacks, catering size margarine tubs and some smaller plastic bags – and which they then hand over to the customer. At the time of my fieldwork, Bacá farmers either sold their produce directly to consumers in the market place on Thursday and Saturday mornings or, on those same mornings, delivered a quantity of *farinha* to individual clients. These might be either small shops and restaurants or particular families. They were not supplying the small 'supermarkets' in the town which were supplied from elsewhere in Pará.

The process is highly labour-intensive and provides only a modest income for Bacá farmers. As mentioned elsewhere, manioc farming and trading is already beginning to be viewed by local urban youngsters as backward and they are aspiring to a different way of life. However, the system does enable cash-poor people to sustain a good degree of agrobiodiversity and to retain considerable control over the production and distribution processes. The question remains, however, as to how this type of farming will enable farmers and *farinha*-makers to continue to maintain agrobiodivresity in manioc *and* supply the local market with quality *farinha* as Gurupá town grows and when, eventually, a road is built to link the town with the towns of the Xingú river.

Transport and trading

Transport, good rural roads and/or well kept interior waterways are essential to trade and, with the possible exception of Gurupá, this type of infrastructure has seen some of the biggest changes in all case study sites within the last 20 to 30 years. As Tables 8-1 to 8-3 demonstrate, road transport is vital to farmers in the Capim, Quaraçú and Alagoinhas areas (see Maps 3-5). In two case study areas, Capim and SW Bahia, there remains the problem of access via dirt roads to more remote farms during the rainy season. In the case of Capim, where river transport remains important for bulk transport for *farinha* to the Belém market

and beyond, the condition of the main road linking Capim town with the interior of the municipality is still vital to keeping down the cost of bringing *farinha* to Capim town from the properties of numerous small-scale farmers. [8] This road is paved and moderately well maintained, whereas the road linking Capim to Castanhal, on the way to Belém, is not paved and is hazardous in the rainy season. (see Map 3). Difficulty of farm access in winter can also be a problem in SW Bahia but here also the BA 265 road linking Belo Campo to the Rio-Bahia highway (and on to Conquista) is now paved. This reduces the journey time for those who trade in Conquista and beyond. (see Map 4). Road improvements here have therefore favoured the larger of the small producers who are only able to trade locally. This might be one of the reasons why some of the markets in the smaller towns of the area (Quaraçú and Lagoa Grande for example) are shrinking in size and importance.

The situation in the Alagoinhas area is better both for family farmers and for larger traders because there exists a reasonable network of paved roads in the area which help to ensure that local market places are still dynamic. The road network facilitates the active trade of many small-scale producers of *beijú* and other starch foods. As mentioned in Chapter 6, this type of small-scale family production has been one of the strategies adopted by family farmers to enable them to remain on the land and to add value to the product of their manioc crop.

Trading can be considered in three categories: trading *farinha,* trading roots and trading starch foods. The trade or exchange of *farinha* has been taking place for as long as records exist although today the type of trade and the markets have changed and continue to change. Most of the ultimate purchasers in the main markets both in Pará and Bahia are from among the urban poor (see Figueiredo 2000 on Pará and Table 8-4). Table 8-4 demonstrates that the strongest market for *farinha* is among those who earn less than 5 minimum wages, who are a majority of the population of the two cities.

[8] This road, built in about 1990 transformed the lives of the people of this municipality. Several of my older informants remembered clearing forest to make the road. A large number of Capim farmers now contribute to supplying *farinha* to the Belém market in a way that was scarcely possible before - and an increasing number of ranchers are buying large areas of land for cattle.

Table 8-4: Domestic consumption of *farinha* in Belém (PA) and Salvador (BA) by income group, 1996 (kgs. per capita per annum)

Income Group*	Consumption of *farinha*	
	Belém	Salvador
Less than 2	33.879	15.631
2-3	39.191	21.241
3-5	39.463	15.498
5-8	35.791	12.021
8-15	31.885	12.452
15-30	26.897	13.064
More than 30	25.670	8.447

* By multiples of the minimum wage.
Source: IBGE *Pesquisa de Orçamentos Familiares (POF)* Family budget research, 1996.
Note: The per capita consumption of *farinha* in these 2 cities and in Recife (PE) is very much greater than in any of the other major Brazilian cities. In São Paulo, for example, the figure for 1996 was 2.702 p.c./p.a. for those earning between 2-5 minimum wages.

Trade in farinha

Those farmers whom I have considered to be 'expert' grow several varieties of manioc and make a good quality *farinha* for domestic consumption and often for the market as well. They are the ones who have the best incomes from this form of agriculture. In all four case study sites, such farmers were able to attract between R$2-5 per sack of *farinha* more than their neighbours selling a poorer product. This was so whether they sold the *farinha* direct to consumers without going through a trader, as happened in Gurupá and sometimes in Alagoinhas, or whether they sold to a trader purchasing the product at the farm. The choice of quality of *farinha* in the retail markets in the towns is assured in various ways. In the Capim case, buyers of the product in bulk in the Port of Belém taste the product before settling a price with the vendor or vendor's agent. [9] Traders buying from farmers in SW Bahia taste the product in the same way. Farmers in the Cândido Sales area reported fairly great variations in the price of high and poorer quality *farinha*. The case of Alagoinhas is a little different. The family farmers who themselves are able to take their *farinha* direct to weekly markets for sale to market customers face competition on the floor of the market. Thus it is clearly in their interests to offer a good quality product. In any case, it is very common for consumers who purchase *farinha* in Brazilian markets to taste a little from various sacks as they choose which one or which ones to purchase. These various practices demonstrate a powerful food culture in action in which both farmers and the urban poor and lower middle class have a share - and which traders well understand.

[9] The sack of *farinha* is pierced with a sharp, hollow, metal implement called a *furador de farinha* and a little *farinha* is removed for tasting. The same type of implement is used both in Pará and in Bahia.

However, as we see from the tables, not all trade in *farinha* happens in this way. Exceptions are to be found both in the Alagoinhas and the Cândido Sales areas. In the former case, although it was difficult to be certain, it seemed likely that traders purchasing *farinha* direct from farmer-producers were less discriminating than in the situations discussed above. It is probable that the poorer quality of *farinha* was being purchased in bulk for Salvador-based wholesalers while the better quality product was to be found in the Alagoinhas market, as mentioned. In Cândido Sales, the large amounts of *farinha* produced in Quaraçú by the rural industries were transported by the manufacturers to distant markets. There was no suggestion that this product responded to the demands of a discriminating and local customer. This relatively mass-produced product did not supply local markets. Later, when I discuss the trade in fresh roots, I will assess the impact of this type of industry both on food culture and on farmers' management of agrobiodiversity.

Trade in biscoitos, beijú and other starch foods

The trade in these locally valued starch foods, particularly in Alagoinhas and Conquista, provides an interesting example of the ingenuity of family farmers and of their adaptation to market pressures. In both these areas the production of manioc remains high yet much of the crop is either traded *in natura* or supplies rural *farinha* industries, as happens in SW Bahia. Family farmers' landholdings come under multiple pressures. For example, plots are divided on the death of parents, there is soil impoverishment, land is acquired by cattle ranchers, and for eucalyptus or other cash-crop plantations, and there is urban migration. The remaining farmers, sometimes with diminished plots, continue to produce manioc as this is the crop that they all know best. By taking the decision to make and market starch foods, farmers/food producers add value to their crop, potentially maximise their earnings from manioc and extend their market range. These producers have also adapted 'traditional', much loved local foods and are marketing them on an easily sustainable scale in a novel way. Ten or fifteen years ago such products would not have been found in such quantities in local markets but would have been made only for domestic consumption or, occasionally, made by a woman to the order of a neighbour. Both in the Alagoinhas area and in Conquista this strategy, although labour-intensive, seems to work. This is because, according to the producers whom I visited and interviewed, the skills already existed to make the various foods, mainly family labour is used, and the production process is no more capital intensive than *farinha*-making. In the Alagoinhas case, various local markets are served and sometimes special, neighbourhood markets. In Salvador and in Conquista, *biscoito*-makers also serve two major markets in the city and cater for consumers of their own social class and origin. This new supply of differentiated local foods has been inserted into what was otherwise a market dominated by the inelastic demand for *farinha* and a wide range of other food produce.

An immense and efficient provisioning

My investigations in the rural communities covered only the four case study sites and were complemented, for Bahia, by repeated visits to the markets of Conquista and Alagoinhas and, for Pará, by visits to the river port and market of Capim and to one of the river ports of Belém (by river-boat with the *farinha)* as well as to one of that city's several large retail markets. This geographical restriction has limited my ability to generalise about the nature of Brazilian markets in manioc. Yet it is clear enough that the markets are very diverse. At one end of the scale markets are intensely local, as in Gurupá. At the other end of the scale they are far flung, drawing from a wide area and serving a large population, as in the city of Belém with its 1.4 million inhabitants. This formidable regional trade, as is shown in Tables 8-1, 8-2 and 8-3, is conducted largely although not entirely through traders acting as intermediaries. The trade continues, despite the development of a national Brazilian market in food products and some diminution in the overall consumption of manioc food products as people's preferences, in some cases, shift to other foods. The consumers of the manioc food production from the farms of the interior are largely the working class populations of the towns and cities.

Just as in other distant places, there is an immense and efficient provisioning which is largely taken for granted and which remains hidden from the statistics of the market. Johan Pottier observes this same phenomenon in Africa, in particular in Rwanda where much of his empirical research was conducted.

> 'The efficiency with which informal channels funnel food in bulk and on a regular basis to Africa's major cities is a prime illustration of the existence of opportunity…. 'There is the continuing, and perhaps increasing, importance of all those forms of organisation which continue to funnel food from rural areas to cities. In terms of actually feeding the cities, as distinct from generating a commotion about it, the non-state sector is still critical.'' (Guyer, 1987 cited in Pottier, 1999:110)

There is no reason to sentimentalise the past as being a 'better time.' Indeed, in some ways manioc farmers and their communities have improved their position by moving on from the kind of client-dependent relationship that was described by my hostess in Bacá to the more independent activities of selling and buying freely in local markets. This kind of trading can mean, as it does in Bacá and Gurupá, that cash-poor farmers are able to sell a surplus of high quality *farinha* in the town's market place on Thursday and Saturday mornings.

A different kind of opportunity has been created by improvements in road transport, as for the small-scale producers of *beijú* and of other starch foods in Alagoinhas or for those rural industries in and around Quaraçú who through intermediaries are supplying such places as

Itabuna and Ilheus on the Bahian coast. [10] Other and more traditional trading links are sustained by the use of river transport to supply markets in cities with expanding populations, as is happening with the constant stream of mostly very small craft that ply the river from Capim to Belém.

It is striking that some farmers have been able to *enhance* their sales of a high-quality manioc food product, even when supplying regional markets. This is happening with those expert farmers who are able to sell good quality *farinha* at higher prices than other farmers are able to obtain for the poorer varieties. This provides an inducement to the expert farmers *both* to cultivate a wide and diverse variety of maniocs *and* to use their skills in food processing. What in other settings would be called 'quality control' is assured by the taste discrimination both of traders and of the ultimate consumers in towns and cities that may be hundreds of kilometres away.[11] Such taste discrimination does not always occur but, when it does, we are witnessing a robust food culture in action.

Not all of this discrimination takes place through genetic diversity. For the starch-based foods of *beijú* and *biscoitos* what signifies is, rather, the skill of the farmer - or erstwhile farmer - working as food producer, utilising existing skills, and not so much finding as creating niche markets. The specific food tastes, reminiscent of traditional foods, come to be prized and sought out by people from among the town and city populations. Here again, we are witnessing a dynamic food culture, with a shared pattern of consumption and taste.

[10] As we have seen, it is still difficult for numbers of farmers to trade manioc products if the communities in which they live still rely on dirt roads, subject to flooding, to connect them to the outside world. The same effect has been noted for *caboclos* trading in non-timber forest products (NTFPs) in remote villages further upriver from Capim. Yet, still, people often do find a way. '[there are the] village women who on several occasions … successfully navigated their way to the nearest market (120 km away) to sell forestry fruit. Each time they returned with goods purchased for the entire community from their profits…' (Shanley *et al.*, 2002: 629)

[11] No official body in either Pará or Bahia ensures quality control in *farinha* but many local government officials and some farmer-producers told me that they believed this market regulation would help producers as well as traders and consumers.

PART 3

CONSUMPTION

A campaigner for social justice, who was a local man and senior spokesperson for the Mayor of Capim, offered an explanation for the neglect of local food cultures, which is felt acutely in Capim just as it is in Gurupá. For him there is an underlying problem regarding the 'development model' that is followed in Brazil and the encroaching culture of consumerism that undermines both nature and the capacity of local people to eat and to keep healthy:

> 'The *caboclo*, the native population that loves the land, which likes extractivism, that needs extractivism, needs (also)…trees, fish, *açaí* - everything that the forest gives - do you understand? And he does not experience hunger. That group - the children are healthy because they eat everything that they have. It is a model that is not globalised, but this type of sustainable management does not follow internationalised, globalised consumerism. We believe that if this were planned, it would solve the problem. Because it would create a balance between technological development that only wants to exploit nature and then abandon her and the ways in which people take advantage of the resources of the land.' (Translated from interview, July 2002)

Underlying these changes in food culture is an original colonial prejudice against the colonised and the lower classes - poor rural people, the *caboclo*, the Indian and black people. The early sugar barons in Brazil recognised manioc as the primary element in feeding slaves and the lower classes and were content to leave the control of the production processes in their hands. The practical effect was to allow the creation of social and geographical space for communities of small farmers and their households to develop their own autonomous food cultures. These local cultures have gone largely unrecorded in the formal discourses of Brazilian history, reliant as these are upon textual and visual representations and reflecting as they do what is deemed to be significant by the dominant classes. In contrast, the essence of local food cultures was - and still is - communicated quite differently: not textually and visually but through the shared memories of the actual smells and tastes of foods as well as the memories of *roças* and *casas de farinha* which have always been, and which remain today, central to hundreds and thousands of lives. Several of my older informants reminisced about food enjoyed in the past.

This system is now being compromised as other and more prestigious foods penetrate local markets. The people among whom I worked, and whose food culture is the subject of this study, semi-consciously or sub-consciously have come to feel that their food and their way of consumption is inferior to an 'imported', standardised, urbanised, industrialised ready-packaged food culture. The product that can be purchased in a shop feels as though it confers a certain status on the buyer – the pasta, the cream cracker and bread. It is as though

wheat products are modern and embody progress, have prestige, while manioc products are rooted in a past with its memories of deprivation and toil.

To ascertain this is not to negate everything else written in this chapter regarding people's delight in the celebration of local identity and in displays of hospitable generosity. Both attitudes - the loss of confidence in an ancient rural food culture and the continued assertion of its value - coexist in a contradictory fashion, in a dialectic of underdevelopment in the heartlands of manioc in the Brazilian interior. As we have seen in Chapter 2, food cultures are communicated as much or more by smell and taste as they are visually, textually or by the spoken word. They are communicated by memory, whether of the individual or by people sharing. The spoken word evokes the shared memory of the smell and taste, or of the colour and texture. Just as important is the pattern, repeated with variations that invite interest and experiment, as women prepare the succession of meals for the household on the daily, weekly and annual round. This shared food culture can be a common factor in different 'economic' functions, whether consumption by a household, gifts of food and hospitality or the selling of a surplus in a local market.

CONSUMPTION AND TASTE: THE SAVOURING OF MEMORIES

> **'**Now I am hungry and am going to end this bla bla bla. However, first I invite my friends to go out, to a certain place, and after a swig of pure Dona Branca [cane liquor], with a good water-*farinha* and a hot pepper sauce and lime, to eat a fried fish which will make you lick your lips and ask for more…You are invited. Don't stand on ceremony…' (Jaques Flores, 1973).

Jaques Flores' invitation is part wistful, part redolent with celebration of the most ordinary of Amazonian foods - fish and *farinha*. The meal will be shared with friends, most likely other men who will also enjoy a swig of *Dona Branca*. They will perhaps eat in a little *barraca* or street stall or a simple popular restaurant and this will also be a moment to celebrate friendship. The food is to be enjoyed outside the family environment and is more about pleasure than the simple assuaging of hunger. For the Paraense, *farinha d'água* has deep connotations of a rural place, of family and of local being and identity. A Paraense living anywhere else only need hear about fish and *farinha d'água* and he or she will recall the tropical heat, the afternoon rain, the smells of the small simple charcoal contraption on which one of those lovely Amazonian fish will be baked.[12] A Paraense may yearn for the *farinha* of his or her home place, which almost certainly is unavailable wherever he or she may be, when far away from home. As we saw in Chapter 2, memory operates not only

[12] In my numerous visits to Amazônia in general and to Pará in particular over the last 20 years, I can bear witness to this aspect of Amazonian food culture. These associations are also copiously referred to by Osvaldo Orico (1972).

textually or visually but also through sensory meaning - the remembered smells and tastes of the foods of home.

The tastes of necessity

Farinha is the main sustenance of the rural people with whom I worked and who are the subjects of this study, both in Pará and Bahia. Unlike starch-based foods such as *beijú* and *biscoitos*, for the people in the case study areas *farinha* is not a comfort food but the pivotal food of the rural diet. The taste that they have for *farinha* enables them to enjoy what they eat as an economic necessity. The consumption of *farinha* in these rural households, relying as they do on their own labour to produce their staple food, is actually experienced as a kind of freedom. This is an area of their lives that they can control.

> '[There is] the sense that at least there will not be self-imposed controls, constraints and restrictions - especially not in eating, a primary need and a compensation - and especially not in the heart of domestic life, the one realm of freedom, when everywhere else, and at all other times, necessity prevails.' (Bourdieu 1999a:195)

Necessity is translated into 'freedom' by the distinctions in taste, in colour and in texture, which these rural people recognise in the different varieties of *farinha* and of the other manioc-based foods that they consume. As Sutton also notes, the mundane, the necessary and the pleasurable are not opposed, but are united. (Sutton 2001:4).

There is considerable variation in the quantities of *farinha* that are consumed per family per month. Evidence that I gathered from a number of families illustrates this observation.

Table 8-5 - Consumption of *farinha* per family

Location	P.	Kgs. (or litres) consumed per month *	Kgs. p.p.m.
Belém	6	(c. 16 kgs) - 20 litres	2.7
Belarzinha, Capim	6	90 kgs (6 latas)	15
Tigre, Quixabeira (Ba)	7	120kgs (30 pratos)	17.1
Tigre, Quixabeira (Ba)	4	(48-72 kgs) 60-90 litres	12-18

Column 2 – Number of persons in household
Column 4 – Kgs. consumed per person per month.
*The different local measurements have been converted into kgs., using criteria particular to that location. The figures given in parenthesis are the conversion.

The variation in consumption depends upon the amount of contact that the family has with the urban outside, which translates into the influence of urban customs upon consumer preferences within the household.

Before the arrival of pastas (*macarrão)*, rice and dried beans in these areas *farinha* was always available during the main meal of the day. Today this meal is called *almoço*, or lunch. For both male and female manual workers lunch is a heavy meal during which

several large handfuls of *farinha* are consumed along with whatever else is being served. It is frequently dry, just on its own. In one family where I stayed in rural Capim the moment that the man of the household arrived at table he served himself a large plateful of the liquid from the pot of beans, a few vegetables (onions and peppers) and filled the plate with *farinha* and hungrily devoured this before anything else. He called this dish *farofa*.[13]

In the rural environment the woman of the house is usually accustomed to serve her man and older sons before sitting down herself to eat with the small children. However, in some households, usually those that for whatever reason have greater contact with urban outsiders, this practice is gradually being replaced and the woman of the house, after serving everyone else, will then join the family at table. Rural women spend a lot of time every day both gathering food for lunch and preparing it. But *farinha* is usually made weekly. Just as there is daily pressure on a woman to provide lunch, so there is that same driving pressure, week by week, to ensure that there is sufficient *farinha* for the family.

Other foods - from farinha to bread

In less than a generation food culture in Bacá has changed, becoming more diverse. As new foods become available so old foods can lose their prestige although this does not always happen. A Gurupá man in his forties, who is now an official in the local government, told me that when he was a child there was only fish and *farinha* - and now there was pasta, rice and beans. One day in May 2002, in the house where I was staying in the forest community of Bacá, we listed 12 different processed or dried food products that had been imported from elsewhere in Brazil as well as frozen chickens from three different sources and three types of fresh meat purchased in Gurupá town. (see Appendix 7) The household represented a fusion of cultures - of the 'old' and the 'new' - as well as of the floodplain and the dryer lands.

Traders have always brought goods up river and up stream into the communities of the Amazon region. Missionaries and other conquerors, including rubber barons and loggers, have brought manufactured goods and industrialised food products into the most remote regions, just as they have manipulated the natural environment for their own purposes in ways that are powerfully described by Hugh Raffles (2002). So it is not at all remarkable that these foods, which sometimes are packaged and frozen in places that are thousands of kilometres away, should be found in a house in Bacá. However, what is notable is that, as in this forest family where the male head of the family with one or more of his adult sons makes *farinha* every week, they do also buy pasta and cream crackers. This same family has

[13] In many other parts of Brazil, especially in urban culture, *farofa* consists of *farinha* lightly fried in margarine to which is added all kinds of other protein ingredients such as hard boiled eggs, mince meat, olives or even seafood.

a house in Gurupá town, which is home for three of their sons. There, in town, they still consume a large amount of *farinha* but they are now purchasing bread as well. And there is little in the formal culture to indicate the importance of the manioc-based foods. Yet, in the informal food culture, the tastes for the manioc-based foods persists, with strong likes and dislikes about the taste of this or that particular food.

The taste for farinha

Farinhas in Bacá and Capim that are made for family consumption are always the best that are made by the individual farmer. As mentioned elsewhere, in Pará *farinha* is crunchy and tends to be on the yellow side of cream. Bacá people explain that there is never enough local *farinha* on the grounds that it is so good that people eat large quantities. Many of them dislike, even despise, the *farinha* that is brought in to the area from outside, notably from Capim and Iritua on the Rio Guamã and from a few other locations in north-east Pará. Gurupá people observe that this inferior *farinha* swells massively when it comes into contact with water, sauce or *açaí* and when it is used to make gruel (*mingau*). In this it is unlike their own product, which remains crispy. It is only suitable for *pirão.* [14] They consider this *farinha* to be dirty and even *fria*, cold. The implication of calling it *fria* is that it is past its best and of poor quality.

May in Bacá is the season of *açaí* (*Eutrepe oleracea),* which is a very popular staple food in Pará. For most of my stay in Bacá almost the only food that my hostess wanted to eat was the dark wine-coloured berry of a palm tree that is pounded into a thick liquid and eaten from a gourd with copious amounts of crunchy *farinha*. She was from the floodplain, the *várzea*, where *açaí* is more of a staple food than it is inland in the *terra firm*e of Bacá. Her husband and adult children enjoyed it very much too but ate it as a first course to their meal that was followed by another course which included meat.

In comparing the method of processing manioc roots for *farinha* making in Bacá and Capim I observed a detail that might explain a difference in flavour which I had not previously noted. Although *farinha* makers in both places used a mixture of *puba* (soaked, fermented roots) and dry roots, the proportions were different. In Bacá, the proportion of *puba* to dry roots was 2:3 and in Capim it was the opposite: 3:2. Several informants in Bacá mentioned that they did not like the *farinha mole* (or fermented) of Capim. They obviously did not consider their own *farinha* to be in this category.

[14] *Pirão* in Pará is typically made by pouring fish stock over *farinha* and allowing it to swell. It may be further flavoured with the addition of herbs.

Bacá people are still making *farinha* entirely by manual methods even though they are well aware that people in neighbouring Pucuruí are using motorised *caititus* that they purchase with money obtained through a project. Their product is known as *farinha comum* (common *farinha*) in contrast to the *farinha de Bacá* that has a higher status. Yet, still, the manually-made product retains its high cultural status. The price on the market is relatively high although, or perhaps because, quantities are too limited to supply even local demand, as we saw in Part 2. (see also Table 8-6 below)

Table 8-6: Types of *farinha* on the open market in Gurupá, May 2002

Type of *farinha*	Price (R$)	Price per kilo (R$)
Toco mole ('*Farinha de Pará*' from Rio Guamã)	21 (30kg sack)	0.70
Farinha de Bacá	24 (30kg. sack)	0.80
Farinha seca, comum (Pucuruí toasted)	33 (50kg. sack)	0.66

Bacá farmers do not distinguish between the *farinha* that they make for the family and the product that is destined for market. In contrast, in Capim (where most producers produce large amounts of *farinha* for the market) people *do* make this distinction. The best is kept for the family. One man told me how he was making a load of the prized *farinha de 3 dias* to take to a relative in Belém. Another family, whose *farinha* for sale in the market was of poor quality and made in dirty conditions, demonstrated to me the care which they took in making *farinha* for the extended family - for the grown up sons and daughters and for themselves. This, for them, was not a *farinha* to be sold but one to be given away to kin.

Although many north-easterners have made their homes in Pará over the last 100-150 years, the taste that Paraenses have for a rough, yellowish *farinha* predominates in the local food culture. North-easterners may have brought their technological and entrepreneurial skills north but the *farinha* culture - from those places where people have a predilection for a finer, whiter product - does not seem to have survived in the rural areas.[15]

Attitudes to *farinha* in Bahia are quite different to those in Pará. Many of the older people whom I interviewed recalled times when *farinha* was made at home and used as a currency for bartering, just as in Bacá. Yet these memories had already faded in younger generations. If farmers or other rural people are unable to make their own *farinha* it is already not uncommon for them to purchase it from a local shop and, just occasionally, from a small

[15] On the other hand, it was my personal observation that in a period of just a few years during the late 1990s, the popular stalls selling food to working people in the famous Belém market of Ver-o-Peso ceased to serve local *farinhas* and began to serve fine, yellow *farinha* of the type easily available in supermarkets.

rural market such as the one in Quaraçú where just two types of *farinha* were on sale in October 2002. No *farinhas* were on sale in the Inhambupe weekly open market.though in the much larger market of Alagoinhas many varieties of *farinha* were being sold, catering for all sorts of local tastes. It seemed that farmers in these areas were no longer giving such priority to catering to local taste by making distinctive *farinhas*. Farmer-producers made their own while urban people were beginning to buy a more standardised product from shops rather than from markets.

Small scale family-run *farinha* making industries and larger *farinheiras* sell the food through intermediaries (in the case of the small-scale places) or directly to large towns and cities. These market factors appear to have eroded the extent to which any rural family identify with a local *farinha*. Yet in Quaraçú this impression is belied whenever local people make a visit to relatives in São Paulo. Several Quaraçú people told me that they would take gifts of *farinha* and *biscoito* on such visits as these products are, they said, unavailable in the city and are particularly appreciated. Sutton, Cook and Counihan are among those who have written about the way in which foods from 'home' convey memories of belonging as well as a sense of community and pleasure (Sutton, 2001, Cook, 2004a and Counihan, 1984). In Sutton's words, with shared consumption in a distant place, 'a wider community of homeland is being referenced in this eating food from home. (*op. cit.*:84) In this case, the 'food from home' taken to São Paulo seems to represent an attempt to prolong memories of the past which, 'at home', were already fading in the case of *farinha*, although not for *biscoitos*.

Despite the omnipresence of *farinha* throughout the north and north-east of Brazil, not everyone is deemed to be able to eat it. Or, at least, there are prejudices against eating certain products of manioc on health grounds. It is considered a 'strong' food. A man in Bacá told me that he believed that it was 'poisonous' and said that he did not eat it because he had an ulcer, gastritis and high cholesterol. When I asked him to explain, he referred not to *farinha* but to *beijú*. *Beijú*, he said, no longer smelt of manioc or of *tucupí* because the mass is washed with water and salt. As I had seen him eating *farinha* I was perplexed and probed further. He then explained that he could only eat *farinha seca* - in other words, the *farinha* that he makes but not the *farinha* that is imported from outside.

A healthy young pregnant woman in the same community had the same views. She said that, although she could not eat *farinha* while pregnant, she could eat *beijú* ('because it is washed'). As mentioned in the discussion of production in Chapter 7, starch is produced in the same location as *farinha* - the *casa de farinha* - where the fibre is separated from starch. So, whichever foods are eaten or rejected within the rural realm, the farming families have

complete control over their decisions regarding consumption of different foods and these are not imposed from outside.

The taste for starch foods

Both in Pará and in Bahia I encountered variations in belief about the value of starch foods. Many believed that old and frail people should not eat *farinha* as it is too heavy. However, they can consume all types of starch products*: farinha de tapioca, tapioca*, the fine *carimã,*[16] *puba seca, beijú, biscoitos*. Everywhere I found that people feed babies and infants on *carimã* mixed with water. The drink looks like milk but is not nutritious at all. *Carimã* and *farinha de tapioca* are used to make *mingau* or porridge for the infirm. This type of food is also considered a comfort food, perhaps to be offered to a husband or a child for breakfast or for *merenda* (see section on *biscoitos* below). These foods are made and offered by women in their roles as carers and mothers. They are quite outside a man's realm.

There are some rich observations documented about the relationship of women to starch in South American indigenous cultures that provide some fascinating insights into the antecedents of the cultural history which surrounds manioc. For example, Christine Hugh-Jones, writing about the Pirá-paraná Indians in north-west Amazônia, discusses perceptions of starch and fibre in Pirá-paraná mythology where starch is female and fibre is male.

> 'From the myth of Yeba's penis, we learn that starch is humanising - a female product promoting male sexual creativity. It appears to be like semen and, in fact, Indians jokingly refer to semen as starch drink (a glutinous drink of starch boiled in water) - the very drink that Starch Woman meant to make when the stranger made love to her. Starch is thus specially female….' (C. Hugh-Jones 1979:186)

Hugh-Jones's observations, albeit about a people who are geographically distant from the subjects of my study, recall an intimate and integral part of manioc's rich cultural history that itself forms part of the historical back cloth of Brazil's rural people for whom the crop is still a central part of their social and economic life.

The taste for biscoitos

In the rural areas around Quaraçú, as well as in Conquista city, *biscoitos* are enjoyed with coffee during the morning as well as for *merenda* towards the end of the day when they are eaten with coffee, warm milk, and other sweet things such as cakes or biscuits. They are not served as part of the main meal, which is lunch (*almoço),* where savoury foods - beans, rice, *farinha,* spaghetti and perhaps some meat - will be eaten. *Biscoitos* are strongly associated with celebrations and feast days, most particularly the day of St. John (*São João*) on 24 June. Every woman I met in the rural interior delighted in telling me about the varieties that they

[16] *Carimã* is not universally known in the Inhambupe area.

would make for the *Dia de São João*, when people open their houses to family, neighbours and friends and even perhaps to strangers. *Biscoitos* would be among the good things on offer to guests. Both in the city and the countryside the production of *biscoitos* increases exponentially around the day of São João.

For one elderly female informant the *biscoito* is much preferred to the *beijú*, which she considered to be an 'inferior' food while her friend clearly believed that the *biscoito,* as well as cake and bread, were the result of people becoming more 'civilised'.

> '*Beijú* is becoming an inferior food. …Today, it seems as though people are civilised and do not like *beijú.* It is more the *biscoito*, cake…and bread.*'* (Conversation with Dona L. and Dona G. near Quaraçú)

It is possible that Dona G. was associating *beijú* with indigenous people or even with slaves. She herself is a black woman. Whatever the reason for these attitudes encountered in the Quaraçú area, *beijú* was not and is not a part of people's everyday diet but the *biscoito* was and substantially still is.

The *biscoito* has been enjoyed in this part of Bahia for at least a century and possibly for up to three centuries. The parents and grandparents of all the old ladies whom I interviewed made and served *biscoitos*. However, a search for the origins of this type of food would require further enquiry into the history of the everyday in the colonial heartlands of Minas Gerais. The fact that eggs, fat and salt are added to the manioc starch suggests colonial influence as do the enclosed, clay ovens in which the *biscoitos* are baked. As long ago as the late sixteenth century Jean de Léry (1990) observed, perhaps with frustration, that manioc starch could not be satisfactorily made into a food as was the bread that he had known in France. His observation indicates that Europeans were experimenting with manioc starch. It is probable that the famous *pao de queijo* (cheese snacks) of Minas Gerais, which is similar in important ways to the *biscoito* and which also is made of manioc starch, had its origins in this area.

Until ten or fifteen years ago the *biscoito* in SW Bahia was almost exclusively the product of women's kitchens and backyards and this is still true of the Quaraçú district. But in any study of the *biscoito* in this region it is impossible to ignore the changes that have taken place in Conquista in recent years. The *biscoito* has become a commodity traded in the huge local markets along with other manioc products, especially products of manioc starch associated with home and comfort. They have adapted a local food product and made it available to urban people who probably no longer have time to make their own product.

In Conquista's great covered market, the CEASA, I interviewed two stall-holders during a single visit in January 2002 and counted 35 types of *biscoito* on one stall (Seu L.) and 53 on

the other (that of Dona N.). Later that year I accompanied a group of rural people from the municipality of Quixabeira in the Sertão of northern Bahia who took home 40 different types which they had collected in the dozens of stalls that they all had visited. A colleague and I had raised some funds to bring them to Conquista to learn about the making of *biscoitos* and to find out how the industry and markets functioned. I was able to learn with them. They purchased a few hundred grams of some types while stall-holders donated others. Yet the counting of varieties is perhaps a meaningless task as each household and each tiny factory have their own recipes that are constantly being adapted.

The taste for beijú

In his important survey of South American indigenous uses of manioc Proenza cited the work of Steward, who had undertaken a review of literature to determine the degree of importance of what he called 'classic' manioc foods (*farinha*, *beijú* and alcoholic drink made from manioc) among the indigenous peoples of South America. He found that 73.01% of the 478 people whom he surveyed ate *beijú* as a staple food along with other foods. Of these people, 61.89% were using 'bitter' manioc varieties. (Steward, 1948 reproduced in Proenza, 1977). He concluded that most, if not all, of the peoples for whom manioc was a subsistence food-crop ate *beijú* and *farinha*.

Archaeologists have demonstrated that *beijú (mbeiu* in tupi-guaraní*)* is an ancient food. The large, round clay griddles upon which *beijú* was toasted in so many old societies are among the objects of the material culture of the early people of the Americas that have enabled archaeologists to conclude that manioc was an element of the food culture of people as long ago as 10-12,000 B.P. (Roosevelt, 1980; Lathrap, 1970; Mowatt, 1989). *Beijú*-making has thus contributed to our knowledge of the history of the American tropics.

In 1995 I was able to enjoy *beijú* made as it probably has been for many centuries. This was on one memorable occasion when I was staying in a cacique's household in the Kaiapó community of Kapoto in the northernmost part of the Xingú Indigenous Park. It was early morning. As we rolled out of our hammocks the head woman of the household invited us to one end of her house to eat. She had made a large *beijú* from the grated mass of manioc. She had baked it on both sides on a metal griddle placed low over the fire that burnt on the earth floor of the house. It was over 50cm in diameter, moist and thick as a finger and tasted and looked like warm wholemeal bread. The men and we two guests were invited to tear off pieces that we ate accompanied by a gourd-full of warm, unseasoned and unsweetened manioc porridge. This indigenous *beijú*, although very different from its contemporary Bahian namesake, is nevertheless its ancestor. It was baked for us on an iron griddle

whereas in earlier times it would have been baked on a clay or stone griddle. But otherwise it was most likely just the same.

The *beijú* that is made by many indigenous people today is perishable. In this way it contrasts with *farinha*, which keeps for weeks or months and therefore was only of interest to settled communities in earlier times. However, in my case study areas, the *beijú* produced does not usually accompany meat, fish, maize, rice or beans in a meal but is consumed separately in contrast to *farinha* that normally accompanies other food.

The cultural history and geography of the transformation of this 'bread' that I was invited to share with the Kaiapó and the contemporary Bahaian *beijú* has most likely yet to be written because, even for my oldest informants, *beijú* in the region of my research has always been as it is today. There are gaps in our understanding but the very recent transformation of the *beijú* in Bahia is the subject of the following reflections.

Beijús in this part of Bahia are made mainly from fine, white manioc starch (sometimes fermented), which is locally called *tapioca* or more generically simply *goma* (see table 7-2 for the terms). There are many shapes, sizes and styles of *beijú* (e.g. *beiju de colher, beijú seco, beijú lencol, beijú caoinha*).[17]. They are usually fine or very fine, smooth or very smooth and crisp - a little like biscuits in that they are flat - although unlike most biscuits in flavour. There is one known as *beijú de tapioca* which is like a fine, white pancake and can be served hot, spread with melted butter or margarine or sprinkled with grated coconut, rolled up and moistened with coconut milk. Some urban consumers today enjoy this and other *beijús* with a grated *parmesão* cheese that is similar to the Italian parmesan.[18]

The variety that is not made with *tapioca* is made from the washed and grated pulp of manioc, formed into a round biscuit-shape of around 6cms. in diameter and toasted on the *forno*. This is a heavy food locally called *beijú de massa*. It is more akin to the *beijú* I ate with the Kaiapó in Kapoto although *beijú de massa* is like a dry biscuit.

I have chosen to focus on the '*beijú* chain' (part of the Manioc Chain) in the Alagoinhas area of Bahia so as to reflect on the transformation of this food and of its social construction in recent decades. On the one hand, rural women have transformed it into a commodity to be traded not only in local markets but also far from their homes - in Salvador. On the other

[17] Spoon-*beijú*, dry *beijú*, sheet-*beijú*, little canoe-*beijú.*
[18] In Recife and neighbouring Olinda, this *beijú* is known simply as *tapioca* and is sold as a local delicacy to tourists.

hand, it is still a food that local people associate with a past of greater plenty and even more domestic security - with working together in the *casas de farinha* where *beijú* is made. One aspect of this transformation is that rural women have rescued and transformed the memory of *beijú* so that it has become a contemporary commodity, redolent with regional and cultural associations. In Salvador, which is one of Brazil's most important tourist cities, the *beijú* is now badged as a 'typically Bahian' food and can usually be found on the breakfast buffet of the city's hotels. Middle class Bahianos like to serve the little boat-shaped *beijús* with drinks in the evening. They have become chic. The smallest rural entrepreneurs, who are mainly women farmers, are helping to create this re-badged 'Bahian' food culture with their indefatigable sense of fun and through very hard work. But this is not the whole story. These tiny family-run enterprises are now beginning to specialise in making *beijú* and other foods made from manioc starch, as we noted above.

The *beijú* production discussed has one essential element in common with rural *biscoito* production in SW Bahia and with non-commercial *farinha* production in Gurupá: the main producers are women. Still today, b*eijú* is the product of a woman's world, squarely located in the family *casa de farinha*, the back yard and the kitchen or in fairly new tiny 'factories' or workshops that emulate these domestic places. However, as the production of these foods grows to become a larger business, so it is common that one of the men of the household begins to work in the business and to share with or even to take control from a woman.

Beijú is not a sweet food but, in order to understand its place in contemporary food culture in this region of Bahia, it must be viewed as one element in a category of foods that also includes all kinds of cakes. Amado Costa defines all of these as *merenda* foods. Her definition of the category is a useful one.

> 'I am calling *merenda* that group of dishes that is not only eaten between lunch and dinner (*o jantar*) but which also includes the Bahian breakfast and dinner.[19] This *merenda* consists of a large number of cakes, porridges, *cuscuz, beijús*, fruit and boiled vegetables, *biscoitos* and various sweets which together - and served with milky coffee, fruit juices and drinking chocolate - make a copious meal.' (Costa 1994:217-8 - my translation).

The women in the Alagoinhas area who make *beijú* also use the *tapioca* (starch) as well as *puba* and *aipim* to make a wide range of cakes which are then sold in the market place on the very same stalls as *beijú*. Wherever I enquired about the making and distributing of *beijú*, I was always told about the cakes as well. These were exactly the type of foods that were served at my farewell *festa* in Mandacarú, a rural community just outside Inhambupe. The

[19] Paloma Amado Costa distinguishes between the contemporary concept of 'dinner' in the North American or Western European sense and the Bahian *jantar* which is a different type of meal in the interior as well as among some Bahian families who still live in a more 'traditional' way.

local women had produced a splendid array of foods for the party, all of them made from manioc products and especially for my pleasure, as my hostess told me! There were boiled and fried sweet manioc, little *goma* biscuits, boat-shaped *beijú*, sweet manioc cake, *tapioca cuscuz* made with coconut milk, all of which were offered to the guests along with flasks of coffee and bottles of soft drinks. After some speeches and a great deal of singing and dancing in the open air an imperceptible sign was given that the party was over - at which point people descended ravenously on the food and cleared the table in the space of five minutes. It was about 10.30 at night and everyone disappeared into the night immediately after eating.

The generosity of the hosts was a good example of the attitudes of rural people to these kinds of foods. They are 'treats'. They demonstrate the presence of plenty and comfort, as well as giving hospitality. Such festive meals may mark a special occasion that is unlikely to be repeated, such as saying goodbye to a stranger, or they may have a 'calendar' dimension, as with the feast of *São João* celebrated on 24th June. Either way, people open their homes and, as an integral part of the celebration, share the profusion of loved and familiar foods. These meals mark the passage of lives and seasons and evoke memories of the past.

> ' … food exchanges … serve as a generalized reminder of a community life in which the roads of obligation are constantly open, not having been short-circuited by the spectre of balanced reciprocity, buying food in a supermarket, which is really no reciprocity at all.' (Sutton, 2001: 160)

Preferences: the social construction of manioc foods

There are sectors of the Brazilian middle and wealthy classes that positively enjoy celebrating Brazilian 'cuisine' and using manioc products – mainly starch products – and that concoct beautiful, original and tasty dishes. This preference, which might be called 'culinary regionalism', is reminiscent of the 'culinary populism' that Bourdieu discusses, albeit in a very different - and very French - context. (Bourdieu, 1990(a):185). Thus manioc farmers find themselves producing for a market driven by tastes the nature of which they cannot imagine.[20]

Different foods are more or less prestigious, with different classes of people. This differential in taste provides us with a means of distinguishing not only between manioc and

[20] A little cookbook, beautifully illustrated, published in Belém (Pa) by a supermarket chain, explicitly the product of 12 'gourmets' of Pará (who are professional chefs), perfectly illustrates this point. (Monteiro, 2002). Also, a cookery course offered to local women in Capim during the *Festival da Mandioca* in July 2002 included a range of complicated and elaborate sweets, cakes and puddings, all of which used manioc starch. These cakes were sold during the period of the main festivities and were especially appreciated by local women. In Bahia, the cookbook-memoire by Paloma Amado Costa, the daughter of Bahian writer Jorge Amado, is also directed at a chic public and celebrates regionalism. (1994)

other foods but also between the different food products of manioc. Thus, as we have seen, in and around Quaraçú people like Dona G. regard *beijú* as an inferior food to *biscoitos*, believing the latter to be more 'civilised'. To an extent, prestige attaches to *the qualities of the food in itself* - taste, colour and texture - and to the subtle distinctions that the educated palate makes between the varieties of a familiar food. Yet, as in this particular example from Quaraçú, the distinctions can also be *social*, with a particular food being rejected as 'not for us' - not because of its intrinsic qualities but because of its former or current class-related or other associations. This is in accordance with the fact that, as is now widely recognised, the foods that we consume are as much about the creation and maintenance of identity as they are about sustenance (Sutton, 2001:5, Kneafsey & Cox, 2002, Crang, 1996).

Connoisseurs of Brazilian cuisine, however much they might enjoy some manioc products, would not expect to find *farinha* on a table in the sort of smart restaurant that they frequent in Brazil's great cities. They might well consider manioc to be the food of blacks - in a disparaging way. Moreover, young women from a more privileged class - in common with many other urban young women - consider *farinha* to be fattening and therefore reject it as a component of their diets. To apply a perception of Bourdieu, a taste for *farinha* is a 'taste for the heavy, the fat and the coarse' (associated with the working class) as against 'the light, the refined and the delicate' (associated with higher social classes). (Bourdieu, 1990(a):185) Indeed, the 'light, refined and delicate' manioc starches and starch based foods are those most used by Brazilian middle and upper classes who increasingly reject *farinha*.

There remains the sense of a regional or national cuisine that, on occasion, is to be celebrated. Brazilians of all classes throughout the country will serve *farinha* with their *feijoada* (a 'typical' Brazilian 'popular' food) on a Sunday afternoon. Meanwhile, the culture of good *farinhas* and a great range of *beijús*, *biscoitos*, cakes and other good things persists among the rural people who are the subjects of this study as well as their urban relations and the customers for whom the small farmers are the principal suppliers.

CONCLUSION

With this chapter I have completed my examination of the different stages in the Manioc Chain - the production of the crop and of the foods and the distribution and exchange of the foods.

Evidently, farmers work in the *roças* so that people, including themselves and other members of their households, can eat the food product. The product is distributed within the

family or sold. The terms on which the farmers trade are regulated by outside forces, represented, in abstract economic terms, by the Market. As we have seen, what is really happening is an immense and impressive, day in and day out, provisioning. This is apart from the supply, also on a day-to-day basis, of the food consumption needs of themselves and of their families and, frequently, by means of gifts, of others within their communities.

Whatever it is that farmers/food producers choose to do they carry out within the context of a long-established and yet continuously evolving agri-culture *and* food culture. These cultures have been formed by their own past practices and by the adaptations that they are constantly making to meet changing circumstances. They respond to external factors by strategising, by choosing amongst the available options. Yet something other than economic calculation is at work, namely, the long established food cultures in which the farmers and food producers, as both producers and consumers – along with the other consumers of the manioc foods - are the connoisseurs.

As we have seen, on one level these cultures reflect social stratification, specifically the associations that this or that food may have with people of high or low social status. On another level rural and urban people alike possess something more than the 'taste for necessity'. They are engaged in a continuous process of distinguishing - by smell and taste and by colour and texture - the foods that they eat, and that they desire. It is when this system of preferences, and of shared memories, is damaged and declines that the 'traditional' system - agri-culture and food culture - is undermined.

Yet change itself is not a problem. The manioc economy-culture is ever changing. It is just that some kinds of external change can be overwhelming. These are the ones that are associated with 'agricultural modernisation' and with standardised and uniform forms of food provisioning. Thus, diversity and differentiation, in both crops and foods, may be either lost or sustained. To understand this we need to view what the farmers do, and what they experience, as through a pair of binoculars, one that has both an 'economic' and a 'cultural' lens.

As I observed in Chapter 2, the Manioc Chain may be likened to a circle, which is joined at the point where what happens in its final stages - from distribution to consumption - feeds back into the production decisions that are made by the farmers. In the longer term farmers can and do adjust their production decisions in response to market factors. Some of them choose to increase and others to reduce the supply, by planting more or less manioc and/or by controlling the rate of harvesting. They can also vary the quality *either* through selection

(more or less variety of the cultivars) and/or through the processing of the food, for example, by putting quality first as in catering for a particular food taste or, alternatively, by putting quantity in front of quality for an undiscriminating mass market. These and other production decisions, such as adding value through food processing, all represent different strategies that the farmers can follow as they adapt to changing markets and as they try to absorb the increased costs of inputs to a more 'modern' form of agriculture and distribution.

As we have seen, some forms of adaptation by farmers as cultivators of the crop and producers of the foods actually gain strength from an existing high degree of agro-biodiversity. Other forms of adaptation, those which prioritise high yield varieties, undermine it.

The pressure is towards the standardisation and uniformity of foods and away from their variety and particularity.[21] When they come to be experienced simply as commodities, foods come to be valued on the basis of their market value rather than on that of the labour, skill and perceptiveness that have gone into their making. Outsiders are only too likely to miss the cues to understanding a food culture. This kind of understanding depends on a capacity by the outsider to share in the sensory-linked ways of experiencing and remembering. As I can testify, many rural people will help an outsider to do just that with an immense kindness.

Knowledge of production is connected with memory.

> 'People who know the garden in which their vegetables have grown and know that the garden is healthy will remember the beauty of the growing plants, perhaps in the dewy first light of morning when gardens are at their best. Such a memory involves itself with the food and is one of the pleasures of eating.' (Berry, 1998:63 cited in Sutton, 2001: 65).

[21] David Sutton describes the effects of such standardisation on the Greek island of Kalymnos. 'Standardization, producing food and fruits out of season, placing health regulations on certain processes of production and fermentation… strips food of its regional diversity, and strips people of their sensory experience.' (Sutton 2001:60)

CHAPTER 9

CONCLUSION

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This chapter is organised in four sections. The first section briefly records the manner in which I have addressed the four research questions. In the second and third sections I present the main findings and conceptual and theoretical points of interest. In the fourth, concluding section I reflect on the inherent limitations of this study and suggest some possible future directions for research. Finally, I suggest that a change in thinking is necessary if on farm *in-situ* conservation is to continue and not be abandoned.

ADDRESSING THE RESEARCH QUESTIONS

1. *In what way is agrobiodiversity in Manihot esculenta* Crantz *(manioc) important for family farmers and others in Pará and Bahia in Brazil?*

For the small-scale farmers in the four case study sites the cultivation of manioc, the management of agrobiodiversity in the crop and the production of manioc-based foods are all an integral part of their way of life and, as such, are a significant part of the culture of these regions. However, the farmers' perceptions and management of manioc diversity exist in a separate realm from that of the agricultural professionals, who are the most influential outsiders. The economic preoccupations of these professionals are rarely matched by an interest in on-farm conservation of agrobiodiversity. This point is particularly demonstrated throughout the two foundational chapters of the study: Chapter 4, which is about local classification schemes and knowledge of manioc varieties, and Chapter 5 in which I locate this research in a continuum of scientific enquiry which has principally been centred on the Amazon region. Also in Chapter 5 I discuss the extent and significance of agrobiodiversity as observed during the fieldwork. Agrobiodiversity is important in the farmers' practices and is significant not only for their own domestic consumption but also for that of the rural and urban populations whom they also supply.

2. *In each of four case study sites, how many varieties of manioc are currently being cultivated and how many have been cultivated within living memory? Has there been any loss in agrobiodiversity in manioc within living memory and, if so, why?*

The 214 varieties of manioc that I identified during fieldwork are named and characterised in Appendix 1. This data includes varieties of manioc which were known to or remembered by farmers in the case study sites as well as other varieties that I could definitely confirm as being cultivated in each of the four areas. In Chapter 5 I address the question of loss and

suggest that the overall loss of genetic diversity during the living memory of my informants could be up to 40 and 48% in three of the four case study sites but only 18% in the fourth site (see table 5-3). However, these findings need to be qualified. The overall figures are likely to be lower than these percentages because, although some varieties are lost or abandoned, a few new ones are always being introduced. Chapter 6, on agri-culture, discusses the very diverse practices that I encountered in the *roças* and sheds some light on how several aspects of agricultural modernisation combine to constitute the greatest contemporary threat to the maintenance and management of agrobiodiversity.

3. *Has there been any erosion in the knowledge base regarding manioc among the populations who produce, consume and market or otherwise distribute manioc and its products? How has this population changed its practices and developed its products of manioc in order to adapt to new life styles and preferences and to the changing economic environment?*

The five central aspects of the farmers' and farmer/ food-producers' knowledge base in manioc, and of their practices, are: their classification of varieties, the production of the crop, the production of manioc foods, the intimate knowledge of manioc food culture and the practical know-how of the diverse ways in which the foods are and can be distributed and marketed. These five elements are discussed in Chapters 4 and 6-8. There was some evidence of an erosion of this knowledge base among the very young generations within the farming families. However, in general, the knowledge base - and the local food cultures - remain buoyant. Farmers and farmer-food-producers are constantly adapting their management practices to new challenges, opportunities and circumstances. They innovate to a considerable extent, using the wealth of knowledge embedded in their cultures. However, many farmers do succumb to economic pressures of various kinds and produce a standardised and even low quality crop - or leave the land altogether. All of these issues are discussed in Chapters 6-8.

4. *How do the research findings contribute to a deeper understanding by agricultural and rural development practitioners and researchers of the significance of agrobiodiversity in a single crop?*

The research findings, which I discuss in greater detail below, present a particularly full view of the relationship between family farmer and the manioc that they manage competently and know so intimately. This is, in part, due to the main concept adopted for organising the enquiry – that of the Manioc Chain. No one study from amongst the literature consulted for this project presents a view of this relationship that contemplates ethnobotanical, cultural, *and* economic elements of farmers' management of the crop while at the same time discussing agri-culture, food production *and* the distribution of the final product of this Manioc Chain. Only a few studies adopt a historical or diachronic approach to small-scale

farmers' agricultural resource management. Yet this approach not only helps to document elements of past practice and culture but can better enable the agricultural and rural development professionals to diagnose and deal with any problems identified.

The discussion of the distinct knowledges and classification practices of, on the one hand, small-scale farmers and, on the other, of agricultural scientists is located mainly in Chapter 4 and is also addressed in Chapter 2. I suggest that agricultural and rural development researchers can deepen their understanding of agrobiodiversity within a single crop by adopting the kind of approach adopted for this study. This approach invites those who are seriously investigating how to conserve agrobiodiversity in a crop to reach beyond the paradigms of their own knowledge base to investigate the knowledges of those farmers who have been the custodians of this diversity for countless generations. I return to this point toward the end of this concluding chapter.

Finally, this is probably the first study in which ethnobotanical data on M*anihot esculenta* Crantz has been gathered together for areas of intense manioc farming in the State of Bahia. In Chapter 6, I refer to the several important studies on manioc that, in contrast, have been undertaken in the Amazon area.

THE MAIN RESEARCH FINDINGS

This enquiry celebrates a deep-rooted and very old agri-culture and food culture in Brazil, which nevertheless is ever-changing. However, the conditions under which the farmers and food producers of this study live and work are economically and physically very tough. It is as well to recall, as we move to the close of this study, that many (probably most) people in the areas where I worked are at least cash-poor and that many of them are among the poorest in a country where one in three live below the poverty line. For most rural families life has improved within living memory with the advent, for example, of improved access to health care and, more recently, to education, improved rural roads and limited credit. It is also as well to recall that the subjects of this study are the people who have been able to remain on the land while so many millions of rural people in Brazil have been obliged to leave, either because they lost the land they had or because it was impossible to survive and to bring up a family on poor land. The urban drift continues. As 'modern' agriculture encourages the homogenisation of agricultural production and food production in the rural areas, the role of family farming is being ever more contested. It is viewed as 'inefficient' despite its diversity and despite its effectiveness at sustaining rural *and* urban people.

Agriculture and agrobiodiversity in manioc

The 214 varieties of manioc found in the four case study sites are set out in Appendix 1. Various aspects of this agrobiodiversity are discussed in the study. A wide genetic diversity of crop resources gives farmers more control over their crops. They themselves select for pest and disease resistant varieties according to the micro-ecological conditions of their farms. Instead of just adopting a single high yield variety, expert farmers and many others choose to maintain diversity in case a recommended high yield variety should run into trouble. Farmers select for crops that can be harvested at different intervals (see Appendix 8) and also for crops that meet their own food needs and fancies as well as those which they know how to transform into foods that meet the requirements and potential of the market. The reasons to believe that this genetic diversity is being eroded generally and in the case study sites have been mentioned above in this chapter as they have, in more detail, in Part 1 of Chapter 2 and in Chapter 5 (see especially Table 5-2).

This research recognises that 'indigenous knowledge and culture are integral parts of agricultural biodiversity management' (Cromwell, 1999 and see Chapter 2 *passim*). Considering the genetic diversity that is to be found in the crops that farmers cultivate, I discovered in all four case study sites that agrobiodiversity in manioc is still valued and actively used by numerous farming families. Although this finding may not have been surprising in Gurupá, the site that is least disturbed by modernising influences in agriculture, the fact that agrobiodiversity is still strongly present in the other three sites is very encouraging. Farmers' classification systems are used for 'keeping track' of varieties used in the *roça*, incorporating different criteria, from their morphological aspects to their economic value as the main ingredient for particular types of *farinha*. All of this is fairly well known by most farmers. In all the case study areas I found specialist farmers who were experts in the management of manioc, the maintenance of its agricultural biodiversity and the production of quality *farinhas* and/or starch food products. Their singularity was a reminder of the unevenness of agricultural practice – and in particular of the unevenness of knowledge regarding agrobiodiversity among the farmers within most of the case study areas.

Farmers take advantage of the distinctive characteristics of different varieties so as, among other reasons, to produce distinctive *farinhas* and other foods for humans as well as for animals, to ensure maximum flexibility in crop harvesting times, to practice rotation among varieties and to constantly experiment for controlling disease and pest-resistant varieties. Farmers handle different varieties in different ways. In common with certain 'traditional' and indigenous farmers in the Amazon region, farmers in the Pará case study sites

experiment with plants that have grown spontaneously from seed. In all areas farmers continue to acquire new varieties which they incorporate into their *roças* out of curiosity. Sometimes varieties are kept simply because they are considered interesting or 'pretty'.

Some farmers in all four case study sites have access to less land today than did their parents and grandparents. Although it is beyond the scope of this study to have explored this critical aspect of the agrarian question, the reasons for this depend on the location. In some places, inherited land has been substantially sub-divided, leaving only small plots for some. But most commonly, especially in Bahia (but also in Capim), poorer farmers struggle to make ends meet. Should their land prove unproductive one year, they are frequently tempted to sell up and move to town or stay on to work as landless labourers. There is pressure from ranchers and larger-scale agricultural enterprises on farmers to sell. The consequence for the maintenance of agrobiodiversity in their manioc crop is that land cannot necessarily be left fallow and crop rotation is inhibited. In both case study sites in Bahia there were farmers who were already using fertilizers (and some were using pesticides and herbicides). In several cases such farmers had chosen to concentrate on high yield manioc varieties, to abandon family-food production and to sell fresh roots on the market. By adopting an economic logic similar to that of the 'modernisers' these farmers were beginning to distance themselves from the model of the family farmer that is predominant in this enquiry. Unless these farmers are able to accumulate capital, it is probable – even likely – that they will have chosen a course that exposes them to the risks of pest and disease attack and that eventually they will lose the security enjoyed by more 'traditional' farmers who continue to cultivate many varieties of manioc.

I have also found that the farmers' classification systems appear to be of little interest to agricultural professionals. To my knowledge, in no one of the case study sites had a full inventory of varieties been collected. The most that could be said is that outside professionals frequently knew of a few of the most commonly cultivated and highest yield varieties. This attitude is reflected in elements of the secondary education system and even in rural schools for young people from farming families. I found that the value of maintaining and managing agrobiodiversity in manioc, which is the single most important crop in all four case study areas, was absent from the school curricula. Indeed, little emphasis was given in these schools to manioc farming and to manioc food production at all. This observation begs the question of whether the bright, well educated young farmers of the future will be able to continue the manioc farming and food-producing practices of their parents or whether, for them, manioc will cease to be valued as an element within contemporary farming.

Food culture

Very early in this research project, as I was developing ideas for the research design, I thought that I would find that there had been some erosion of agrobiodiversity in manioc in Pará and Bahia and that probably the food culture would be diminishing in parallel. However, I have found that the opposite is true in the case of food culture. The huge markets of the big cities of these large states offer a range of different *farinhas* for sale, *tapioca*, *carimã*, various kinds of cakes and *beijús* and, in Pará all manner of *tucupí* sauces, the soup called *tacacá* and many of the starch-based products that I discuss in Chapter 7. It has simply not been possible to discuss all the foods and drinks of manioc in this study. Yet it is evident, as I have made clear particularly in Chapters 7 and 8, that this food culture is very much alive. As explained in Chapter 2, and as is confirmed in my findings, food cultures are communicated by the smell, taste, colour and texture of the various foods - and by shared experiences of meals and shared memories of meals. This experience underlies whatever is said or written. I have also found that the ingenuity, knowledge and know-how of farmers/food-producers, both women and men, is ensuring that this food culture retains all its vitality as an element of Brazilian culture. It seems as though it is here to stay. The types of food made and marketed by small-scale farmers may continue to change as these producers take advantage of new opportunities and new markets by adding value to their produce. This is happening particularly in Conquista and Alagoinhas, for example, where *biscoitos* and *beijú* are made both to supply local people and to extend the reach of the market for these products beyond the poorer consumers – who, still, are the main consumers of *farinha*.

As I demonstrate in Chapter 7, a huge amount of food is still being produced in the rural areas for distribution within and beyond the communities. The technological changes and adaptations to the differing circumstances of farmers signify how these farmers are both improvising and taking advantage of opportunities to acquire labour-saving machinery, whenever they can afford to do so (for example, in the *casas de farinha).* The system of production both of the manioc crop and of the various associated foods in the rural areas suggests that there is a degree of stability. However, this stability could be vulnerable to changes introduced in any stage of the Manioc Chain which arise from external economic factors and that run counter to the well informed, deep-rooted internal cultural logics of production.

The food culture of family farmers is integral to, and cannot be separated from, their management of every aspect of the Manioc Chain. The management of the Manioc Chain is

a part of this aspect of local and regional culture. No aspect of culture is static, but is always dynamic. As we have seen, this is true of every stage in the Manioc Chain, as farmers themselves adapt to change. The farmers do this according to their own and not to any external logic, informed as they are by an intimate knowledge of and feeling for both the taste of the foods and the characteristics and genetic diversity of the crop. External logics usually are driven by economic criteria, rarely incorporate the logic of cultures marginal to the dominant, capitalist culture and exist outside the realm of the farming families who are the subjects of this study.

The final point in this round up of findings related to food culture is to do with the exchange of *farinha* and other foods. The enquiry confirms the findings of several other researchers who have carried out studies in other parts of the world, namely, that small-scale family farmers are substantially responsible for the provisioning of the cities. This point is discussed in Chapter 8 while the different types of marketing arrangements are set out in tables in that chapter. Farmers are supplying acceptable, good quality foods of manioc to the poorer people of the cities. The agrobiodiversity that is maintained in the *roça*, coupled with the farmer/food-producers' know-how, enable them to cater to diverse local and regional tastes. A system of heterogeneous foods and agricultural systems persists and contrasts favourably with the homogenising influence of 'modern' agriculture and industrialised food supply.

'Modernisation' and Change

Both in the discussion of food production in Chapter 7 and when analysing the different types of trade in manioc products in Chapter 8, I draw a distinction between different scales of operation. Foods are produced by family farmers either on a very small domestic scale or, where the produce is destined for the market, on a larger scale, which can be classified as a small-scale enterprise. Most of the food production in the case study areas fell into one of these two categories. In most cases the food producers were still farmers.

However, in Bahia, in the areas that are most directly affected by the pressures, demands and opportunities of an increasingly complex market as well as by the influence of agricultural scientists, changes were beginning to take place on the farm. In the Alagoinhas and Cândido Sales areas, for example, I identified several farmers who were growing manioc in order to sell the fresh roots to traders to meet a distant demand either from larger scale rural industries or, in Conquista, from family-managed small-scale enterprises manufacturing

biscoitos and some *farinha*. The farmers targeting this market no longer produced *farinha* or other foods. This phenomenon is discussed in Chapter 8.

On the other hand, in these same areas, we are beginning to see the emergence of small-scale family enterprises that are producing foods but are no longer farming. All of these families had been growing manioc until recently but now were specialising in food production. They continued to make use, in their new, more specialised businesses, of all their knowledge of the various characteristics of different varieties of manioc.

There is evidence of a separation of tasks between farming and food production in these areas, which is a significant indication of changes adopted fairly recently by farming families as they find ways of adapting to the changing economic and commercial environment. Just so, I was also able to observe the local and regional impact of the establishment of rural industries. In Quaraçú, SW Bahia, one of the impacts of the presence of nine of these industries was that they provided paid work for a large number of women. These women were therefore no longer available either to farm or to process manioc and produce manioc foods for the market. However, a number of family farms did still exist in the municipality where *farinha* was still being made. The much-appreciated *biscoito*, of local fame in that region, was still being made, but only domestically, not commercially. The commercial production of *biscoitos* in the region was centred in Conquista where it absorbed the labour of both women and men.

One might conclude that all these changes had begun to erode people's knowledge of the Manioc Chain in these manioc-growing areas. Whereas, even a single generation ago, farming families would have been proficient in their practical understanding of every aspect of the Manioc Chain, we are now seeing a degree of specialisation which may signify a break in the Chain for the next generation. In other words, the next generation of farmers may no longer know about *farinha*-production while the next generation of *biscoito* producers in Conquista and of starch producers in the Alagoinhas area may no longer know about farming and even fewer may know about the value of genetic diversity in manioc. The process of 'modernisation' in manioc has already commenced, although the geographic areas studied retain a patchwork of different types of practice and, significantly, retain the food culture.

Trade and trading patterns have changed as well over the last 15-20 years. Where markets are either very local, as in the case of Gurupá, or otherwise quite close, as with the case of the markets for the produce of farmers in Capim (who supply Belém) and Alagoinhas,

farmers/food-producers and the people who consume their produce most likely have a shared taste for the produce. In these cases, farmers know their markets and their customers. Many customers are likely to be urban people originally from the rural areas surrounding the metropolitan areas. However, when food produce becomes just one more commodity and is traded through impersonal links involving large wholesalers and long-distance travel, then another link in rural people's understanding of the Manioc Chain is broken.

There are types of market where consumers are quite distant and where food producers cannot therefore be expected to know whether a taste is shared or not. Taste or *quality* is determined by the trader in these cases who pays the farmer according to his, the trader's, own criteria. The trader then purchases f*arinha* and transports it to supply a wholesaler in Salvador, for example, or even in Belém or, in the case of Cândido Sales, in Itabuna and Ilheus. This *farinha*, traded in bulk, then loses the sort of connotations to which we refer in Chapter 8 - the connotations of comfort and home - and is transformed into just one more commodity in the federal market. When it comes to the trade in roots, the product of the *roça* becomes quite alienated from the farmer who does not transform it into distinctive and desired food. There is no longer any obvious incentive for the farmer to maintain genetic diversity in the manioc crop.

Any discussion of modernisation and of change in the provisioning of manioc products to the market in Brazil is incomplete without considering the place of industrial scale production in Paraná and other states in southern Brazil. The *rural industries* referred to in this study in no way compare to the starch and *farinha* industries in southern Brazil. The scale of production and the technologies used are quite different, with the rural industries in Bahia being much closer in scale to the small family enterprises in the region. These industries in Paraná supply supermarket chains in Brazil and other distribution chains throughout the country, including in Bahia and Pará. These products also fill the gap if production in the north and north-east is insufficient to meet demand. Yet it seems improbable either that Paraná could meet the demand of the north and north-east or that production in the regions where I have been working could be sustainably transformed to produce both the crop and the foods to meet this demand. If this hypothesis is correct, family farmers will still continue to fulfil a central role in the supply of manioc foods to urban and peri-urban markets for some time to come. There question remains, however: how can family farmers be supported and encouraged to value agrobiodiversity in manioc before this resource is lost?

CONCEPTS AND THEORETICAL ADVANCES

During the course of this enquiry I applied theory and methodologies that have been developed by ethnobotanists to the tasks of documenting and understanding agrobiodiversity in manioc. It is uncommon for theoretical concepts drawn from ethnographers and botanists to be applied to the study of the management of agrobiodiversity by small-scale farmers. In the study areas the relationship between scientific investigation and these farming families is normally mediated through agricultural research and extension institutions that are largely unfamiliar with the concepts developed by the ethnobotanists. There is an advantage in applying such a multidisciplinary methodology to the study of the management of a single crop by small-scale farmers. This is that the researcher is more likely to *understand* the farmers' culture, logic and practices and so be able to devise mechanisms that will reduce the risk of the erosion of genetic resources. Although there is much talk of 'working in partnership' and 'participative research' in development studies, researchers are rarely able to devote the necessary time to understanding the different realm which is constituted by the farmers' culture (including the food culture, fed by agricultural production), by their practices and, in consequence, by their contribution to and adaptation to change.

One of the most rewarding aspects of this study was the work that I was able to undertake with older farmers, some of whom had already retired. These men and women provided a wealth of information and insights into how farming and rural life used to be and also how they perceived and used varieties of manioc, some of which were no longer cultivated in the respective areas. The memories that women shared with me about food preparation and food culture enabled an understanding of local histories and the strategies that they used to adapt to changing times. Men's memories had their own value for this research, seeming to be accurate regarding technologies that they had adapted for the production of *farinha* and for the management and renewal of genetic diversity within the *roça.*

I have noted in Chapter 2 that Brazilian Amazônia has attracted many types of study and projects aimed at addressing the loss of biological diversity within this rich ecosystem. Two groups of researcher-practitioners (PLEC and IPAM based in Belém) are concerned with non-timber forest products and peasant livelihoods, including agriculture. Yet, despite the centrality of the crop in the region's economy, little work has been undertaken on agrobiodiversity in manioc among non-indigenous family farmers in the region. In Pará there are at least some research groups that are concerned with these issues and that are experienced in working closely with small-scale farmers, fishing communities and other traditional people. However, in Bahia I was unable to identify any such research group. I believe that my own study is a necessary first step. I have been able to apply some of the

insights and experience gained by researchers in the Amazon to the north-eastern state of Bahia which, in terms of its manioc culture, shares so much with its Amazonian counterpart.

The limitations of this project and future directions for research

Adopting the concept of the Manioc Chain has enabled me to present a broad view of the manner in which farmers' manage agrobiodiversity and change in manioc. Yet it was not always possible to probe issues in the depth that they might merit, given restrictions on time and human resources. A small multidisciplinary team involving, ideally, an economist or sociologist knowledgeable about rural economic development and peasant strategising, would have amplified my insights into the distribution and exchange of manioc and manioc foods. True, macro studies of the manioc economy and of trading in Brazil have been carried out within EMBRAPA-CNPMF (see Chapter 8). Yet it is through the micro studies that we are able to learn most about peasant strategising within a complex evolving and modernising market. As far as I know, very little if any research of this kind has been undertaken in Brazil. I hope that my findings help to prepare the way for a deeper awareness.

It was not possible for me to fully include within the scope of this research the operations of the small rural industries in Quaraçú. Like the marketing just referred to, these industries are a most important aspect of this part of rural Brazil. Such industries impact on family farmers' management of change in more ways than I have been able to consider in this study. The production and distribution processes of these 'intermediary industries', culturally and technologically close to the family farmers, nevertheless are distinct from family production just as they are quite different from the manioc industries in southern Brazil.

These rural industries impact on the environment in two ways. They use large quantities of timber as fuel for the *fornos* in the toasting of *farinha* and the drying of starch and they eject the noxious effluent, locally called *manipuera,* into the environment. A member of the academic staff at the University of SW Bahia was concerned about these negative environmental impacts of rural industries and started to investigate solutions. This environmental issue, which is very specific to the areas where rural industries are functioning, merits the attention of specialists who are sympathetic and sensitive to the interests of rural people.

Finally, there is still a huge amount of work to be done, within Brazil and in close collaboration with Brazilian educationalists, agronomists and others who are concerned with the *in situ* on farm maintenance of agrobiodiversity in manioc - a diversity that will continue

to benefit farmers. Researchers can learn more through well-selected case studies but, above all, it seems relevant to ask the important question. This is how we – the outside 'professionals' – can help to ensure that this wonderful and ancient resource is more widely valued. How can we disseminate cultural, economic and ethnobotanical information about the Manioc Chain in such a way as to awaken interest in the value of this diversity – and, indeed, of genetic diversity in other vitally important crops for millions of small farmers in Brazil?

CONCLUSIONS

As a result of this enquiry, I suggest that a change of thinking will be necessary if the *in situ* on farm conservation of genetic diversity that is still practised by many family farmers is to continue and not be abandoned. The impacts of the modernisation of agriculture on small farmers, and the associated economic philosophy among agronomists and other agricultural scientists, are two of the most significant reasons why this agrobiodiversity is today at risk in the north and north-east of Brazil. Increasing pressures on family farmers to produce fresh roots for rural industry and *farinha* for distant markets is intermediated by large-scale wholesalers. This pressure of market demand presents opportunities. Yet there are inherent risks for resource-poor farmers who decide to abandon traditional-style agriculture and food production, over which the family has considerable control, in favour of a style of agriculture which depends on one or two varieties of manioc requiring regular 'modern' agricultural inputs that must be purchased.

The concept of the Manioc Chain has helped us to develop a broader and deeper view of manioc farming and manioc food production within the context of a strong food culture. If any one link in the Manioc Chain is broken there is an ensuing risk to the maintenance of agrobiodiversity.

It is still possible for farmers to continue to creatively manage the genetic variation of manioc in their charge. We have seen how they adapt to externally induced changes strategically by changing their practice in any one - or in any combination - of the several stages of the Manioc Chain. For example, they may continue to draw on local knowledge while also learning from outsiders such as agricultural extension agents, the media or campaigning and rural development NGOs.

Some analyists have recommended institutional development so as to help ensure that agrobiodiversity is effectively managed at local and national levels, while remembering the rights of those who manage this diversity to a fair proportion of the benefits (e.g. Cromwell *et al.*, 2001 as discussed in Chapter 2). The *framing* of and the *approach* to the issue of retaining agrobiodiversity in the 21st century that is raised in this study entails a different kind of understanding:

- looking beyond the terrain of agriculture and agricultural practices to the production, distribution, exchange and consumption of the foods
- focusing on genetic diversity in a single crop (and not only on crop and natural resource diversity within a farm or ecosystem)
- re-conceptualising on-farm *in situ* conservation, not as preserving an existing state but as providing support to farmers' strategies for managing change.

If there is to be a change of thinking in this area, where better to begin a programme of work than in schools, colleges and universities, so that young people can learn to celebrate their inheritance - of which all my farmer-informants are so proud?

I should like to end with a few verses, exactly as she wrote them, from a poem by Dona Lera, an elderly lady, poet and retired manioc farmer who taught herself to read and write when she was young. She lives near Quaraçú, Cândido Sales in Bahia. Let us make sure that the sadness in this poem does not become an epitaph for a culture.

Como fazia farinho nas tempo de autrora	**How we made *farinha* in times past**
Na minha juventude	When I was young
Como fazia farinho	I made *farinha* like this
Relava mandioco na roda	I grated the manioc using the wheel
Enxugava em uma prencinha	Dried it out in a cloth
Torrava em um forno de Pedra	Toasted it on a stone griddle
Mexiendo com umas paetinha	Stirred it with some flat bits of wood
Ali preparava a maça i a goma	I prepared the mass of damp manioc
Pra depois que termino	and starch here
Agite da farinha	So when I had finished
Pra as forno não esfria	Stirring the *farinha*
Ali fazia os bejú	Before the griddle grew cold
Deixava eles torra	I made the *beijús*
	And I left them to bake
Hoje todo esto se acabou	
Pra os rico foi otimo	Today all this has ended
Pra os pobres piorou	For the rich, it was great
Não pode pagar a inerzia	For the poor, things got worse
Nem o transporte nem o motou	We can't pay the electricity
	Or the bus or the motor
O Pobre tem a mandioca	
mas ele não tem condição	The Poor Man has manioc
Para fazer a farinha	But he is not able
Pra manter a percizão	To make enough *farinha*
Ise perder a mandioca	To meet his expenses
Piora a situação.	And if he were to lose his manioc
	His situation would be even worse.

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APPENDICES

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LIST OF PHOTOGRAPHS

APPENDICES

APPENDIX 1A SWEET AND BITTER VARIETIES OF MANIOC & *MANIÇOBAS* IN THE COMMUNITY OF BACÁ, GURUPÁ, PARÁ.

1 BITTER MANIOCS (*As mandiocas*)

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
1	**Abacate**	**G**	pale yellow	farinha (pale yellow), tapioca, beijú			8
2	**Achada**	**G**	pale yellow	farinha – dry and made from soaked root (*Puba),* beijú	In other municipalities this variety *Barcarena* and *Achada amarela* are confused (7) Long lasting and very dry, The farinha tastes very good. (2) NB The word *achada* means 'found' in Portuguese.	My mother had this variety. It was found in the forest in a place where an old *roça* had been. (2)	7,2
3	Achada amarela	**G**	yellow		See *achada* above. NB The word *achada* means 'found' in Portuguese.	The father of 13 has this variety.	13,11
4	Achada pretinha	**G**	pale yellow		Some call this *achadinha* (the diminutive of *achada*). High yields of *farinha* and starch. Dry – there are even times when you need to add water to the grated pulp. It is good to soak the root in water. (7) NB The word *achada* means 'found' in Portuguese.		7
5	**Amarelinha**	**G**	yellow	*beijú* (especially *beijú ligero*) , *farinha, tucupí, tapioca.*		The mother of source 2 had this variety.	2,7.
6	Apapá	**R**	yellow		Non-branching variety.		
7	**Iracurú**	**G**	yellow (1,11) quite yellow (7)	everything	Watery. Few branches (7)		1,7.

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
8	**Arari**	**G**	yellow (1,11)	*farinha, beijú* (especially, *beiju. ligero* (1)	Fast maturing variety.	Some say it is no longer known.	1.,11
9	Bacuri	**R**					
10	**Barcarena**	**G**	pale yellow (1)	*farinha, farinha seca, beijú* (especially *beijú chica. (1)* cheiroso (1) (esc)	Good smell (1). Yields many roots (1) Makes a tasty *beijú* – but not very white. (13) See also note on *achada* above. (7)		1,7,13
11	Bette	**R**	white				11
12	Campina	**G**	very white	farinha	See note on *mandioca do beijú* below.(7) Fast maturing (8 month) variety. Partial description: Young leaf violet, petiole violet and long, narrow leaves, ramification Y, stem brown and red striped.		7
13	**Carrazedo**	**G**	yellow (1,11)	farinha and tucupí.	No starch therefore not useful for *tapioca* or *beijú*. (1) Resistant to '*queima' (7)*	Name of a zone within the municipality.	1,7,11.
14	Chico Marques	**G**				Comes from Carrazedo. (11)	11
15	Dona Tomasa	**R**	pink (2)			No longer exists (2)	2
16	**Farias**	**G**	yellow	*farinha, beijú* and *tapioca.*	Good sized, very large roots. Resistant to *queima*	Seu Farias (now deceased) brought this here from Taperera (on the road).	

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
17	**Folha Estreita**	**G**	white (1) pale yellow (7)	*farinha, beijú* and *tapioca*	The manioc that last the longest (before harvesting) (1) It is the most resistant to *queima*. (7)	Mother of 2 grew this from spontaneously seeded plant 80 years ago.	1,7.
18	Graciana	**R**	white	*beijú chica*		Until 2 years ago (ie 2000), this was one of the most commonly grown varieties.	
19	**Guilherme**	**G**	pale yellow (4) white (11)	Everything	6 month variety. 'From the first basket of roots harvested you get 2 *latas* of *farinha'. (4)* (Note: it is therefore very productive)	It is from Almerim. Farmer 4 brought 5 sticks back with him.	4,11
20	**Jaçana**	**G**	amarela (1)	*farinha, beijú ligeiro* (1) *urubé queimoso* (10)	Dry (7)		1,7,10
21	**Jaçana baixinha**	**G**	good yellow	'Beautiful' *tucupí, farinha, beijú ligero* …everything. (4)	Farmer 4 confirmed that there are 2 distinct varieties: *Jaçana* and *Jaçana baixinha* (little J*açana* – ie. not a tall-growing plant*)* (4)	The father of farmer 4 grew this.	4
22	Jaraçi	**G**			Only to be found in Bacá. (12) Resistant to *queima* (7) Mature after 12 months (7)		12,7
23	Jarucú	**G**	pale yellow (7)			Variety from Jarucú. The mother of farmer 7 had it.	7
24	Joaquina	**R**	white				11
25	Josina	**G**			The female neighbour of farmer 13 has this variety..		13
26	Mamão	**G**	white (11) yellow (7)		In the *roça* of the mother of one of the school students.		11

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
27	**Mandioca amarela**	**G**	yellow			Comes from São Paulo.	8
28	**Mandioca do beijú**	**G**	white (2), very white (7)	beijú**,** white *farinha.*	According to 7, this is the same as *Campina* and *Roxinha* which, like *Sardinha* are very white. (2)		2,7.
29	Maniteba	**G**	pale yellow	*farinha, beijú*.	Partial description: Full root, red-green stem (the lower part of which is pale yellow), petiole dark red, 1-5 lobules, leaf green (paler on the underside, very curled over), it has a flower. Uncommon variety.		
30	Maranhense	**G**	white		Partial description: narrow, long leaves, 7 lobules, dark red stem, *gema* protrudes by 1.5 cms. (6)	A colony of settlers from Maranhão state arrived in Bacá (the year the Pope visited Brazil) and brought this variety with them.	6,11
31	Mosara	**R**	white	*beiju*	See note on *Mandioca do beijú*	Mother of farmer 7 planted this	7
32	**Mulatinha**	**G**	white	everything	Easily affected by *queima*		11
33	Musara	**R**	white	*beiju*			7
34	**Pai Lourenço**	**G**	cream, palish.	*farinha* and *tapioca.*	'Pretty - and it grates beautifully. (4) In Brasilia neighbourhood people say that it no longer exists (11). (Note: Farmer 4 lives on the edges of Brasilia and grows this variety which he brought from far away. It is a variety which his neighbours do not know but imply that they once knew).	Farmer 4 brought this variety from Almerim where there is a lot of manioc grown.	4,11
35	**Peixe Boi**	**G**	white	*beijú chica, 'dry' farinha, carimã(1) tapioca(2*)	'Vulnerable to *queima* (*7)* .	The shape of the root explains the name – large and bulbous	1,2,7.
36	Pirarara	**R**	yellow				11

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
37	Rapazinho do Sertão	**R**					7
38	Roxinha	**G**	white	*beijú chica* (11)	See note on *Mandioca do beijú.*		11,7
39	São José	**G**	pale yellow	*farinha, tucupí, tapioca, beijú ligero,* everything		The mother of farmer 2 knew this variety but she did not always have it. It is from Bacá.	2
40	**São Tomé baixinho**	**G**	pale yellow (3)	*beijú ligero, farinha, tapioca*.(3)	This is one of only 4 varieties planted by farmer 3 in his very damp *roça.*	This is called *baixinho* because the first ramification is very low. The adoptive father of 9 celebrates the day of Saint Tomé – although it is not common to do so in Bacá. (3)	3,9
41	**Sardinha**	**G**	white	*farinha, beijú,* especially *beijú chica.*	See the note on *Mandioca do beijú.* This variety does not need to be washed as much as *Peixe Boi*, *Folha estreita* or *Barcarena.* (Note: this implies that it is less toxic). It conserves its colour well (13).		
42	Seis meses branca	**G**	white		This six month variety is grown in the floodplain areas of the community (*várzea) (11)*		11
43	Seis meses roxa	**G**	pink (?)		This six month variety is grown in the floodplain areas of the community (*várzea) (11)*		11
44	Sol	**R**	yellow (?)				7
45	Tartaruga	**G**	yellow		Grown in the *roça* of the mother of a school student. (11)		11

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
46	Traira	**R**				The mother of farmer 7 grew this. The implication is that it is no longer known.	7
47	**Tucumã**	**G**	very yellow (2) (11)	*farinha, beijú* – especially *beijú ligero, cheiroso and chica (2)*	After 2 years it becomes watery. (2)		2,11
48	**Vidro**	**G**	really pale yellow (4)	*farinha, beijú, tapioca (4) (White farinha (11)*	It softens easily when soaked. Easy to grate. Fat, nice root. (4) It is a small plant (my obs.)	The name, *Vidro* (glass) – is because it is hard. Farmer 4 is still testing this variety.	4, 11.
49	**Un-named (1)**	**G**	yellow (like *Peixe Boi* and similar to J*açana*)	*farinha*	The root is large and fat. Very hard to process. (1)	This variety self-seeded – but the farmer (1) is not going to plant it again.'	1
50	*Un-named (2)*	**G**			Partial description: pale young leaves, green stem the upper part of which is dark red, petiole violet, 7-8 lobules, *gema* spacing 3 cms apart.	Farmer still observing plant.	5
51	*Un-named (3)*	**G**			Mature tree growing in the yard of the Rural Workers' Union (STR) office in Gurupá. Leaves unusual. Although we were told that several people had taken cuttings from it, there was no additional economic information available. It does have a root (suggesting that it is a variety of *M. esculenta* Crantz) but its qualities were not known. **(describe from R&Appan)**	Brought from an area on the River Mojú where there is an Association called APROSEM some years ago – from a floodplain area (*várzea) (7)*. Local agronomist says it is called *Cearense*.	7 and various people in the STR.

2 SWEET MANIOCS (Macaxeiras) and 'MANICOIERAS'

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
1.	**Macaxeira Branca**	**G**	very white	cakes, boiling, gruel, (*carimã* in the old days), lovely white *farinha* (4)	Planted separately in the *roça*. White *farinhaI* made using a mixture of soaked *macaxeira* (for 3 days) (*mole*) and dry *macaxeira* Plantada separada da roça.	The cousin of farmer 4 brought this from Macapá.	4
2.	**Macaxeira Manteiga**	**G**	white	cakes, *beijú, gruel,* 'sweet manioc' *farinha*	According to farmer 7, this plant is similar in appearance to mandioca *Jaçana.*		7,2
3.	**Macaxeira Santarem**	**G**	white	cakes, gruel, 'sweet manioc' *farinha*	Dry. Good for sick people. Sometimes confused with *macaxeira pretinha.* (7)		7,2
4.	**Manicoeira 1**	**G**	cream	*tucupí, tapioca*, *tapioca* powder (Note: *manicoeira* cannot be used for *farinha*. It is too wet)	'It is said that it is good for animal feed – that it is less toxic' (2) but farmer 2 does not use it for this purpose.' 'Rice and cará boiled with tucupí is very good'. (10) (2) Tapioca powder is used to alleviate burns (like baby's talcum powder).	There were 2 similar varieties but one is now lost. (2)	2,10.
5.	Manicoeira 2	**G**		Tucupí.	To make *tucupí:* it is grated, sieved and boiled until it reduces by 25%. It becomes sweet. It is grown separately in the *roça.*		6
6.	Macaxeira pretinha	**R**	very white (7)		Sometimes confused with *macaxeira Santarem*. (7)		7
7.	Macaxeira amarela	**G**	yellow		Note: *macaxeira* is usually only popularly acceptable and recognisable as non-toxic when it is white. This variety is an exception.		

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
8.	Macaxeira Pintadinha (14) or Brasil (10)	**G**	white		Unusual green and yellow leaves used as a decorative plant in catholic church garden and parish house in Gurupá. Gardener lady (14) informs that it is good to eat, with a fine skin – some of her neighbours agree that it is good. Named 'jokingly '*macaxeira Brasil*' because green and yellow are the colours of the national flag. (10)	Brought to Gurupá by the catholic priest who travels widely in the municipality.	14,10.7.
9.	Macaxeira (da acha branca)	**G**	white		Observed in Gurupá town by (7). The variety has a white stem.		7
10.	Maniva Jiboia	**G**	white		'Nearly like *mandioca* but with a stem like *macaxeira*.' (7)	Jiboia is a type of snake. The plant was given this name because of its curly stem.	7
11.	Macaxeira Munguba	**G**	white		The plant is yellowish (10)		10
12.	Macaxeira Baia	**R**	white				11

Notes:

1. Varieties typed in **bold** are those for which I have first hand, detailed descriptions.

Sources:

1 Seu B & Dona L
2 Seu M. & Dona Luc
3 Seu A.
4 Seu C. & Dona M.
5 Seu MG & Dona G.
6 Seu MGe
7 Seu B.
8 Dona M
9 Dona MR
10 Seu A (teacher)

11 Bacá School
12 Casa Familiar Rural (CFR)
13 Dona L
14 Gurupá gardener.

APPENDIX 1B **MANIOCS AND MACAXEIRAS OF SÃO DOMINGOS DO CAPIM, PARÁ**

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
1	**Amarelona**	**G**	yellow	*farinha, goma*.	6 month variety. Good resistance to *podridão.*		5.
2	Angelim	**R**					9
3	Aruã (Uruã)	**R**	yellow		Very toxic (2) Quite toxic (another source)	Grandfather of farmer 2 planted this.	2
4	Batatinha	**R**	white.	*tapioca*		This was an old variety in the time of elderly lady 8.	4, 8.
5	Boa Viagem	R	yellow	*farinha*	Nice *farinha*		
6	Bragança	**G**	yellow	*farinha, tucupí*	'The leaves cannot be eaten'. For a farmer in 17, part of his crop of *Bragança* survived *podridão* when other varieties succumbed.		17
7	Branquinha	**G**	white		White stem, very big roots (4)		4
8	Camarão	**R**					
9	Carga de Jumenta	**G**	yellow	*tucupí.* Good for cattle feed.	*Manicoiera.* Non-toxic. (nb. maniçoba in Bacá.)		10
10	Cearense am.	**G**	yellow		Good roots but not many of them (2)		2,3,8,13. (notebook 1:192)
11	**Cearense branca**	**G**	white		Many farmers commented that it is very vulnerable to *podridão.* Yet one farmer (4) found that is was resistant. 'When the soil is poor, I plant *Cearense*' (11)		4,8,11,13
12	Chapeu do Sol (macaxeira)	**G**	white	*beijú, goma*, *3 day farinha, good for carimã (2)*	Very mild (i.e. non-toxic). Does not soften when soaked in water.		2,13
13	Deus me Deu	**R**	white		Dark red outer skin		12
14	Dona Antônia	**R**					

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
15	EMATER	**G**			Resistant to *podridão.*	Introduced into the community of Trinidade by extension agents from EMATER.	7.
16	Gurijuba	**G**			Found in a farmer's roça by the river in Catita. Farmer 4 was the source of this but did not grow it.		4
17	Hambrugesa (Brugesa)	**G**	white	*Farinha* does not turn out pale.		Farmer 2 used to plant this.	4,2,11
18	Inha	**G**	yellow		Resistant to *podridão.* Partial description: White/silvery slim stem, very bushy.	Farmer 2 used to plant this. Probably old – in time of father of elderly lady it was known as (*Maniva Inha*) (8)	8,2,5
19	**Jabotí**	**G**	white (11) cream (1) and yellow. (old var.)		The apparent confusion about the colour of this old, but well-know variety might be explained by a lady from (group 8). She says that although it is yellow, when washed 3 or 4 times, it becomes white.	Older lady in Ladies Club in Capim town (*Club de Mães*) (8) says *jabotí* is an old manioc that was yellow. She knew it when she was 15 – in the time of her father (c.1945-55)	11,8, 2
20	Jiboia	**G**				Zig-zag stem accounts for the name (of a snake). c.f. *Maniva jiboia* from Bacá (?)	
21	Jurará am.	**R**	yellow				3,14,11
22	Jurará branca	**R**	white				3,4
23	Macaxeira amarela	**G**	yellow		Note: *macaxeira* is usually only popularly acceptable and recognisable as non-toxic when it is white. This variety is an exception. (c.f. Bacá *macaxeira* with same name?)		
24	**Macaxeira branca**	**G**	white	*Beijú, carimã* and *farinha.*			1

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
25	Macaxeira roxinha	**R**	white				
26	**Mandicuera (manicoeira)**	**G**	yellow	Leaves used for *maniçoba.*	Sweet. *Maniçoba* made from the juice.		1
27	Manteiga	**R**			*Mandioca* – although this name often given to *macaxeira*		
28	**Maranhense**	**G**	yellow	*Farinha, carimã, beijú chica, beijú coroa,*	Resistant to *podridão.* Likes more muddy ground (3) 10 month variety. It does not go bitter during processing. The inner skin is dark reddish thus the starch is a little red. which is not very good.	Comes from Jacundaí. Farmer 3 says that another name for this might be *Arará.*	2,3.
29	Mijuba amarela	**G**	yellow		A very lovely manioc..		2,13
30	Mijuba. branca	**R**	white		Huge roots (4)	Female farmer 4 used to plant this variety.	4
31	Mirití	**R**					4,10,11.
32	Musara	**R**			Reddish skin.	'We do not have this variety any more' (8)	8
33	Olho Verde	**G**	white		Non-toxic. Cannot be used for making *beijú.*		5.
34	Pacajá amarela	**R**	yellow		Female farmer 4 spoke of a large and a smaller variety. *(Pacajá açu & mirim.)*	Father or 4 used to plant this.	4,2
35	Pacajá branca	**R**	white		Farmer 1 thinks this is the same as the variety known as *6 meses* (6 months).		1
36	Pequí (pacuí)	**R**	white		14 said it was a huge plant. Very toxic – the most toxic of all.	Farmer 2 used to plant it. Grandmother of wife of 9 liked it.	15,9,2,14,8
37	Pinga de Ouro	**R**	yellow.				4
38	Pintadinha	**R**					17

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
39	Pretinha am.	**G**	yellow	Nicely yellow *farinha*	Large plant. You cannot mix this manioc with others when making *farinha* as the grains do not mix together.		1(?), 8.
40	**Pretinha branca (Goiabá)**	**G**	white	*Farinha, goma.*	Softens after soaking for 3 days. The residue is clear and little used. The root is small. 9-12 month variety is Resistant to *podridão.* Best quality and yield of the white *farinhas*.	Alternative name, *Goiabá*, given by farmer 3.	3,6.
41	Quinze kilos	**R**				The name means '15 kilos', suggests high productivity per plant.	
42	Raimundo Domingo	**G**	yellow.			This is originally from Ceará and was brought here from the municipality of Sta. Maria do Pará.	
43	Seis meses	**G**			Farmer 1 thinks that this might be the same as *Pacajá branca*.	The name means '6 months'.	4,1,11
44	Tainhã`	**G**	yellow		One farmer was applying organic fertilizer to this and obtained 'enormous roots'. It softens beautifully. Has a whit skin.	On this farm, this variety was being grown together with 2 fruit trees, açaí palm (*Euterpe oleracea)* and cupuaçu (*Theobroma grandiflorum)* all of which were being oranically fertilised. The farmer was being advised by extension agents in this experiment.	16

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
45	**Tapuia**	**G**	yellow		Farmer 15 says it is very resistant to *podridão* while another farmer had the opposite experience. 'It is the biggest and best manioc here – can obtain 13 *sacas* per *tarefa'*.' (Note: high yield) (13) It is good after soaking for 4-5 days.		3,4, 2, 13, 14, 11.
46	**Táxi do Paulo (Paulisinho)**	**G**	white	*Tucupí, goma, farinha* .	Very toxic. 'If a cow eats this, it dies – although pigs do not die.' If it does not soften well during soaking, it becomes bitter . Makes a good farinha.	The mother of farmer 1 used to grow this.	1,11(?)
47	Táxi grande	**G**	white	*Farinha, goma,* everything.	Resistant to *podridão*. Big root. Dry – very dry.		15
48	**Táxi vovó**	**G**	white	*Beijú, carimã*. Leaves good for *maniçoba*	Vulnerable to *podridão.* Very white *carimã.* One person wonders if it is not the same as *Táxica (?)*	The name literally means 'Granny's tree' which might suggest that it is an old variety.	5,8,15,2,11
49	Táxica	**R**	white	**Beijú, beijú chica.**	One person wonders if it is not the same as *Táxi vovó* (?).	In area 13, this variety has all died.	13
50	Táxizinho	**R**				The name, is the diminutive of *Táxi.*	
51	Torrão	**R**			It is not good for soaking in water.		4,2,6
52	Un named	**G**				EMBRAPA introduced this variety to the community of São Bento, Jaboticacá	7
53	Zulinda	**G**			Tall plant. Large number of '*olhos*'		4,11

Column 3: G – varieties confirmed being grown**. R –** Varieties remembered
Notes:

1. Varieties typed in **bold** are those for which I have first hand, detailed descriptors.
2. **Podridão** – root rot (*Pytophthora drechsleri)*

Sources:

1. Seu D. Breves, Catita.
2. Seu S. Estrela, São Joaquim
3. Seu R. - São Joaquim
4. Dona R. Catita
5. Dona J. - São Joaquim
6. Dona ME - Palheta, Catita.
7. E. – EMATER
8. Older women from Capim's 'Mothers' Club' (*Club de Mães*).
9. Seu S. (Catita)
10. Dona A. (Estrela)
11. Dona R. (Catita)
12. Seu M.(Catita)
13. Assentamento Fé em Deus
14. Community of Estrela
15. Seu Z. (Estrela)
16. Seu R. (Km18) Info. via EMATER
17. Farmers at municipal workshop on manioc production, July 2002.

APPENDIX 1C **MANIOCS OF SOUTH-WEST BAHIA**

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
1	Aipim branca	**R**	bitter		'It was bitter' (22) (Note: *'Aipim'* is normally considered 'sweet' or non-toxic. This seems to be an exception)	The name means 'white *aipim*'.	22
2	Aipim preta	**G**	sweet			The name means 'black *aipim*'.	22,24,25
3	Aipim rosa	**R**	sweet			It no longer exists today (5). The name means 'pink *aipim*'.	5
4	Bico de Urubu	**G**	bitter. white	*farinha (15)*	Good variety, almost as *Sergipe*. Very good in ground that has been burnt but does not develop in poor soil. (3) Widely known.	It attracted a bug. My obs. in 19 – the root pulled up after 3 yrs. was rotten. This is why people stopped growing it – but farmer 3 would grow it again. (3)	3,15,17,19
5	Branquinha	**G**	white		Similar to *Pratinhão* (5)		5,7,8
6	Bromadeira	**R**	sweet		Note: is this is the same as *Velho Brumado?*		

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
7	Cacau ***ou*** Aipim Cacau	**G**	sweet. white	Not useful for *farinha.* Farmer 8 sells it deep frozen in the city. Fresh roots sold in markets.	Best of the sweet maniocs here (3) Roots sold fresh in the city (5) Outer peel described as red ((7) or lilac (19). It does not sprout when newly planted unless the ground is very damp. (3). Widely known.	Very old variety (3)	3,5,7,8,13, 19, 22, 24
8	Cacau Preta	**G**	sweet		Farmer 16 was planing it for the first time. You can pull it up for cooking at 6 months. The peel described as 'black' (16) was red to my eye. But 16 confirms that it is different to *Cacau.* Description in roça 15	Vem dum primo tambem de Possidônio	16,15.
9	Calombo	**G**	sweet	Fresh roots sold in market. Frozen for sale to super-markets.	This *aipim* is better than *Cacau*. It is recognisable in the local markets as an *aipim. (8)*		8
10	Cramoquem (**or** Camoquem)	**G**	sweet. white. *Aipim*.	Cannot sell whole root in city as outer skin is 'black' even though it is an *aipim*. (7) (note: and people do not recognise it as sweet) Frozen pulp sold to super-markets.	'Black' peel (7). Small leaves, young leaves 'black'. Mature at 1-4 metres. Can harvest after 2½ -4 yrs. Farmer 9 used to harvest it at 3 yrs. Resists drought. Not good in all soils (5) 'No one likes it – it is hard to grate. It doesn't develop. After harvesting at 2 yrs. the production falls. (3) Description in roça 15 – see also roça plan.	The name is that of an extinct indigenous people from the region. Suggests the variety might be old.	1, 7,5,8,9, 13,15, 22,24

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
11	Un-named	**R**	sweet, white.			Farmer 14 remembers this but has not planted it for 10 yrs.	14
12	Gaiuda	**R**	sweet		The root grew to be 3 metres in length when harvested at 3 yrs. (9)		3,9,17
13	Gegi - ou *Geg preta*	**R**	bitter	*farinha*	Short, fat roots, 3-4 per plant. Farmer 18 harvested it at 3 yrs., farmer 22 at 5 yrs. 'The *farinha* was priceless*' (18)* **Caule c. 75cms diametro - quasi redonda.?? check notebook**	It was known 50 yrs. ago in the Penhafiel Estate 10kms. away in the *mato do cipó..* (18)	18,22
14	Julieta (24) Juliana (16)	**G**	bitter, black	*farinha* Non-toxic for cattle & other animals.	'Fairly common' (16) (My obs. rarely mentioned outside this community)	Farmer 24, a man in his eighties, has known it since childhood.	24,16
15	Lã de mole	**R**	bitter				3
16	Lazã	**G**	semi-sweet (23)	Starch and *farinha*	Not widely known in Quaraçú/Lagoa Grande areas but Farmer 3 knew of it. Says it is the most common in the *caatinga* (dry lands) in the municipality of Tremedal. (3) confirmed this.		23, 3.
17	Lisona	**G**	white, sweet.		Similar to *aipim preta* (24)	It has finished. (4) Was grown by cousin of farmer 1. According to 24, it is planted in the north, in Pernambuco.	1,4, 24

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
18	Malacacheta	**G**	white, sweet.		The easiest to grate (1). Harvested at 2 yrs. It is an *aipim* (1) Farmer 25 has it (24)		1,24
19	Manteguinha (or São Pedro) (16)	**R**	sweet		São Pedro is 3m high. (24)		24,16
20	Manteiga	**G**	sweet		'I thought this was nice.' (3) You harvest it at 15-16 months. Farmer 3 grows this in his organically fertilized 'special' garden (*quintal*)	It came from Barro de Furado on a lorry coming from outside. (3)	22,3,
21	Milagrosa (a) sweet (b) brava (14)	**G**	(a) sweet (b) bitter		Although one farmer says that a bitter variety exists or existed (14), they all talked about the sweet variety. Farmer 3 obtained some the previous year (2001) and has 3 plants in his organically fertilised garden (*quintal*) It could not be harvested before 3 years – it is a late variety (9,1). Farmer 22 remembers it too.	The sweet one has disappeared according to (1) It is very old and was known to the grand-parents of (3) Someone brought it from Salvador to farmer 1. It used to be confused with *Sutinga* according to (22)	1,3,9,14,22
22	Mulatinha	**R**	bitter		3 year variety (22)		22
23	Orelha de Onça	**R**					17

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
24	Pacaré	**G**	sweet, yellow.	*farinha*, (yellow), cakes, cattle & pig feed. (27)	It is an *aipim* – among the least toxic. Quite rare. Makes a tasty, yellow *farinha.* If it is fertilised, it matures quickly (in 13 months). Good for cattle/pig feed after 2 yrs. (27) The cutting germinates with difficulty (1). Has a 'black' outer peel. (20) It is the best one for yellow cakes (8) It does still exist today. Does not have a good flavour (boiled?) (26)		1,8,20,26,27
25	Pão	**G**	sweet, white		Fast growing (12 months). Very white roots. Partial description: Young leaf very dark nearly black. 3-5 lobules. Flower and seed present when observed. *Olhos* – 8/30 cms. Green stem. Farmer 3 growing it in experimental, fertilised garden. (My obs. Is not the same as *Pão de China).*	Farmer 3 growing 50 plants. It 'appeared' 3 years ago.	3
26	Pão de China	**G**	sweet, white (14)		A variety that is remembered by a few farmers. I found it growing in one *roça* (14) and described it.	Farmer 5 thinks that this variety no longer exists. Farmer 9 says that it comes from Brumado where it has another name. 14 used to plant it a lot 10 yrs. ago for animal feed.	1,5,9,14
27	Pará	**R**	Sweet		(5)		5

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
28	Paraguaya ***ou*** Paraguá	**R**	Sweet		*Aipim* (1)	Farmer 5 said it used to be grown there.	1,5,13,17
29	Perequitinha	**R**	bitter, white..		The most bitter (toxic) (1)	(1) conhece desde menino	1
30	Periquita	**G**	white & bitter when younger than 3 yrs. after 3 yrs. it becomes yellow (4)	very good for *goma* – not so good for *farinha (23)*	Matures only in 2 yrs.(23, 1) Has many branches. More watery than *Sergipe.* (1) Very good variety. Low growing. (3) Farmer 3 says it is the same as *Bico de Urubu.* (Note: Source 23 has a starch factory and does not make farinha. Farmer 3 is well informed and made no mention of this characteristic.)		1,3,4,23
31	Pingachão	**R**	sweet				24
32	Pratinhão ***ou*** Platinhã	**G**	sweet, white.	Special *farinha* cattle feed.	Farmer 1and 4 report vulnerability to 'rust' *'ferrugem'* and 19 reports vulnerability to *podridão* and small roots*.* 12 says it is very watery – also that it loses its leaves during times of drought. Farmer 10 says you cannot leave it long without harvesting because it becomes problematic. Easiest to grate (1) 2 yr. variety (1) 'I call it '*Branquinha'* (see above). It is an *aipim*. (5). Farmer 14 says it is the best for *farinha*. (14) It is the best of the region and makes special grade *farinha* because it never swells with water. This farmer cultivates it intercropped with *urucum (Bixa orellana).* Says he left one plant for 10 years and it grows new roots (7) (Note: An agronomist questioned this)	This variety is from the time of my parents – and of the oldest nations. (5) The 'rust' finished it off. It lasted about 5 years. (4)	1,4,5.7,9,10,12 ,14, 19 Most people know this veriety.

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
33	Pratinhinha	**G**	white.		It is very white. It is harvested at 2-2 ½ yrs (17) (or 18 months (3). It is good to plant (3) it tends to rot with the rain. (17) Good yields (14)	It was known in 1951 (17) It finished in 1968 – there was a problem with *tamandua*. (9)	3,9,13,14,17
34	Pretinha	**G**	bitter		A late variety but yields well. Small roots. It does not tolerate (heavy) rain. (14) Difficult to grate (26)		14,17
35	Roxinha	**R**	bitter		It was harvested early and was full of water. (22)		22
36	Salangó (or Salagó) (2 distinct varieties)	**R**	Both varieties bitter (24). Not very bitter (17)	Fattening cattle.	Variety of special interest as the single root (22) is huge– 2 metres or larger – thus spacing between plants had to be at least 2m. A late variety, harvested between 4-8 yrs (3,9,17). 'It was good – it never had any diseases'. Thick peel (17). The women would 'wash' it (sic) with a heavy knife. Good for fattening cattle. There are two types (3,24) one with a shorter stem than the other.	An old variety, remembered by some of the best farmers in Quaraçú and Lagoa Grande. I found it in higher area to the SE of Quaraçú among other old and late varieties. Farmer 3 infomed me that it was to be found in Volta Grande, Lagoa Preta and Tremedal.	3,9,17, 22,24

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
37	'Sempre Verde' (or unknown)	**G**	sweet		Described in *roça* 16.	Farmer had temporarily named this plant 'Evergreen' but said that others would not recognise it by this name. The cuttings came from a neighbour in the church.	16
38	Sergipana ***ou*** Sergipe (Another name Soubauma? 22)	**G**	Very bitter. White, becoming cream and almost yellow with age.	Strong flavoured white *farinha* which people like. Good for *goma.* Root not useful for animal feed, but leaves can be used for this purpose.	The most commonly planted variety in this region. 2 yr. variety. Outer and inner skin is 'white' (1) (Note: my obs. in roça 21 (check) was that the outer peel is dark brown and the inner skin white) It does not grow on all soils – is vulnerable to '*queima'* (1) Ants (including '*sauva*' attack this variety less (19) Farmer 9 says that ants even die if they attack this. Does not loose leaves during drought (12) Leaves and upper part when milled and dried are good for animal feed. (3) Very white *farinha* (11) Drier than *Pratinhão (12)* Buyers (of the roots) like this best as it has less water (4) You can peel it like an orange (12) Description in *roça* 21.	Arrived here less than 10 years ago. (4) Traders from Sergipe brought it here to sell (6) (Note: an agronomist, originally from Sergipe says there are no bitter varieties used in Sergipe)	1,3,4,9,11,12,19,21. Everyone knows this variety in this region.
39	Soubara	**G**	bitter	*farinha* animal feed	First class for *farinha* and for animals. Very bitter. Similar to *Cramuquem.* (5)		5

No	Variety	G/R	Most important characteristics (see note 1)	Uses	Notes	History	Sources
40	Sutinga Sutinga de cepo	**R**	sweet (24)		(Note: although fairly widely known, there seemed to be some confusion as to how many different varieties of *Sutinga* there were. Some farmers said 2, others could name 3) We planted this for 10 years, then it was suffered an attack of *broca* from top to bottom (4) The root of the faster growing variety grows to be 2 metres in length in 2 years. The stem is 2cms in diameter. But you can harvest it after a year or even less (7)	Existed when farmer 24 (now in his 80s) was a child. Is confused with *milagrosa* (22)	3,4,7,9,13,14, 22,24,
41	Sutinga de talo	**R**	bitter.		Farmers 9 and 14 harvest this at 3 yrs. The stem is not to be eaten (24)		3,9,14,24
42	Sutinhão	**R**			This is very tall (grows up to 3 meters) and is harvested after 3 years. (3)	Farmer 3 has not seen this variety for many years.	3
43	Taboquera	**G**	sweet		A good one, with a root about 70cms in length (22)		22
44	Tauá	**R**			We used to harvest this after 3 years. (9)		9
45	Vassoura	**R**	bitter (17)		'This was an early variety – we used to harvest it at 2 ½ yrs.' (17) (Note farmer 17 was an elderly man) It never bacame diseased – it had big roots. I would plant it again. (3)		3,17,19,24
46	Vassourão	**R**			We harvested this after 3 yrs. (9) The root was larger than *Vassourinha* (24)		9,24
47	Vassourinha	**R**	bitter		It is not the same as *Vassoura* (3) It has a short, thin root and is low-growing. (24)		3,13,24,
48	Velho Brumado	**G**	white		Could be the same as *Pão do China* Also compared with *Belo Jardim (2).*	The uncle of farmer 1 gave this to him.	1,2
49	Vila veia ***or*** (Vilha velha?)	**G**	bitter	*farinha*	Harvested after 3 yrs (9) or between 3-4 yrs. (3)		3,9

Notes:

1 **Column 3 – G -** confirmed being grown**. R. -** Remembered

2 **Column 4 – Most important characteristics**. The attributes noted in this column are those which are immediately used to describe the variety by local farmers. I have deliberately allowed the inconsistency between the bitter/sweet distinction and the white/yellow distinction. This phenomenon is discussed in the chapter on the naming of plants.

3 Queima and broca – can be various types of disease.

Sources:

1 Seu A. - Simão
2 Anselmo Viana - UESB
3 Seu F. - Lagoa Gre
4 Seu D. & O. - Lagoa de Melquiades
5 Seu E. - fazenda (próxima à Conquista)
6 Padre V.
7 Seu C - fazenda (próxima à Conquista)
8 Seu N. - faz. Amarelina (próxima à Conquista)
9 Seu M. Simão. Entrevista gravada.
10 OF Agronomist - Quaraçu
11 Presidente, STR C. Sales
12 Seu S. and Dona L. Lagoa Gre
13 D. - Estribo I.
14 Seu M. - Quaraçú
15 Seu S.
16 Farinha makers, Quaraçú
17 Seu A. - Possidônio
18 Seu J. (Quaraçú) - memoria. entrevista gravada.
19 Seu J. (Quaraçú bar)
20 Seu Vi. & Dona. I. - Mumbuca
21 Dona N. and Dona G. – Quaraçú
22 Seu C. (Quaraçú)
23 Dona L - Estiva. Memoria entrevista gravada
24 Factory owner, Tremedal.
25 Seu F. – Possidônio
26 Seu M. – Possidônio
27 Dona M. – Quaraçú
28 Seu AJ. – Quaraçú

APPPENDIX 1D **MANIOCS OF *AGRESTE* OF ALAGOINHAS**

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
1.	**Atalaya**	**G**	black	*farinha,* cakes Not good for *goma*	'Nearly *aipim*'. Mais ruim para goma. Farinha 'morena'. Massa de bolo.	It comes from Serrinha. (19)	19
2.	Bom Jardim	**G**	white(?)		Same as *Cemitério* (9) One of the best in resistance to whitefly (*ácaro).* Agronomist 2 does not know this variety.	Introduced by EBDA agronomists to many regions of Bahia – and locally, to *Colonia* (8).	8,9
3.	Bonitinha da praia	**G**	white	*goma*	Gives a lot of *goma* (starch) White manioc with a reddish stem. Root is 30-35 cms. in diameter. Young leaves are yellow. (19 & pers. obs.) 10-12 month variety. It can be grated without peeling. (18)		19,18
4.	Branca Leite	**G**	white		Fairly common in Crisópolis. 8 meses.	It is a local variety which has almost disappeared. It was good. (8)	8
5.	Caatingueira	**G**	white	*tapioca*	An 18 month variety, especially good for *tapioca*		18
6.	Carirí	**G**		*farinha*	8 month variety.	According to farmer 10, it came from Sergipe.	10
7.	Casuá	**R**		*farinha*	Interesting old variety. Very toxic – 'dangerous'. The root is good – can be huge, abut 5 metres in length giving 60 litres of *farinha*. Harvested at 6—8 years. You have to leave the *farinha* 7 days before eating it' (11)	Old variety, remembered for its extraordinary qualities..	11
8.	Catarina	**R**				Farmers 10 remember this but no longer have it.	10

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
9.	**Cemitério**	**G**	black	*farinha, goma,* boiled. Animal feed..	Some consider this an *aipim*. (4, 10). You cannot eat it raw. Makes a very pale *farinha* and is very good for *goma* (4) The best *farinha* (10) It has a good flavour when boiled (11) You can give it to animals (3) You can harvest it before it matures – very hard to grate. (11) Described in Formoso.		3,4,10,11
10.	Cidade	**R**	grey				1,2
11.	Cidade da Praia	**G**	white				19
12.	Cidade Rica	**G**		*goma*	One of the best for *goma*		19
13.	Cigana	**G**	brownish				19
14.	**Cravelão**	**G**	black		Resistant to *podridão* up to 8-9 months but after that, you will lose it all to the disease. (10) Harvested at 2 years. Described in Formoso.	A local variety (8)	1,2,8,10
15.	Cravela	**R**	black	*goma, carimã, farinha.*	In good soil it gives a good root (3) Toxic (5) Resists whitefly (*ácaro)* well. Might be the same as *Fura chão (18)* New leaves dark red, leaves dark green. It tolerates mud. Harvested at 10-12 months. (18) Good for *goma and carimã (18)* the best for *farinha* (19)	It appeared in the 1963 emergency. But now it no longer exists. (5) It was supplied to many regions of Bahia including Colonia (8)	1,2,3,5, 8,18, 19
16.	Cravelinha Branca	**R**	white		It does not dry (10)		10
17.	Cravelinha Preta	**R**	black		It does dry (10)		1,2,10
18.	Cria menino	**G**	white		Flesh and skiin white (11), Harvested at 4 years - –2yrs. minimum. If you eat it raw, you become ‘drunk’. (16)	It is still planted in communities near to Formoso: Retira, Tamburi & Las Flechas (11).	11,17,16

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
19.	Esgalhardinha	**G**	brown		Produces well. Harvested at 12-18 months when fertilised – and will last up to 4 yrs. Resists sun and rain. Each plant yields well. Stem green, new leaves yellow-green, very long leaves, 7 lobules. White flesh.		18
20.	Estralo	**G**	pale brown		Very long stem (same as *São Lourenzo).* Very large leaves. 7 lobules. Root white when mature, flesh white. Fine skin, easy to grate. Large root. (18)		18
21.	Fura chão	**R**				Another name for *Mata nego (7)* or *Cravela* (18)	7,18.
22.	**Inveja**	**G**	black	*goma, farinha*	Red stem and red root – very pale flesh. 7 lobules. Roots easily but rots in the mud. 10-12 month variety. 'Does not grow unevenly' (18)		18
23.	Inveja mirim (**ou** 'verdadeira')	**G**			Many branches. Hard root.	The name means 'small' or 'true'. This is the old variety of *Inveja*'	18
24.	Itapicurú	**G**	white		'Black' new leaves, pale red/green stem. Large leaves. 7 lobules. 10-12 month variety.		18
25.	**Jajé** (or Jalé)	**G**	black	*farinha*	Farmer 16 planted it a lot. Very toxic. Dark coloured root, pale stem (16) Difficult root. You had to leave the *farinha* for 7 days before eating it. You could keep ants away by spreading the leaves over the *roça.* Agronomist 6 says that it was hard to grow. Described in Crisópolis	As it was hard to grow, it is not planted very much now (6)	6,16. **check source 16?**
26.	Lagoão	**G**	black	*goma.* Animal feed.	Very good for *goma*, good to grate (4) It does not dry – but is good for animal feed (3)		1,2,3,4
27.	**Landí**	**G**	white	*carimã*	Flesh yellowish. Good for *carimã.* Gives a large quantity of pulp. 10-12 month variety.	*Landí* is a tall tree of the *brejo* region. (known also as *Jacareúba*)	18

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
28.	Macumbera	**G**	white		Low-growing plant with many branches. (18)	It came to the farm about 5 yrs. ago from Pindoba, Alagoas.	18
29.	Mandioca brava	**G**			Very toxic. Only produces roots after 2 years.		15
30.	Mandiocona estupro	**G**			'If the soil is good, it produces a root 1 metre in length.'		4
31.	Maraíba or Maria Pau	**G**	black	*farinha*	Hard root – difficult to grate. (4) Very toxic. The worst for goma.		1,2,4
32.	Mariquitinha also Mariquitão	**G**	black		It tolerates mud. Fine skin. Root does not grow long but it is fat.		18
33.	Mata nego	**G**			Another name for *Fura chão*. 18 month variety. Tolerates mud. Outro nome para fura chão - vejá acima. 18 meses. Aguenta barro. (19)		7, 19.
34.	Milagrosa	**R**	black		18 month variety		19 (or 18?)
35.	Olho de Pumba	**G**				Farmer 3 obtained it from a neighbour (3)	3
36.	Olho roxo	**G**			Single stem, no branches. Grows very tall and is very productive. (10)		10
37.	**Platina** or Pratinha (same as Praiana and Prainha 1,2.)	**G**	White.	*farinha.*	'The worst – the most toxic'. Skin and stem white, very pale *farinha* (1,2,4) Easy to peel and grate (8,4) Dry. 10-13 month variety. Vulnerable to whitefly (8) The root is soft. (19) Described in 19.	Agronomist 8 says it is a local variety. In Colonia, farmers only planted this during the drought of 1994.	1,2,4,8,19, 18
38.	Praianinha or Prainha ?	**G**	white	*goma*	10-13 month variety. Dry. Productive. It can be grated without peeling. (18)		1,2,18
39.	**Salagolinha**	**S**	white	*goma, farinha*	One of the best for *goma* and is good for *farinha* too. The roots are heavy		19
40.	Sutinga	**R**	preta				1,2
41.	Unha	**R**		*farinha*	Very toxic. The *farinha* must be left for several days before eating. (11)		11

No.	Variety	G/R	Colour of root	Uses	Notes	History	Sources
42.	**Vermelinha**	**G**	white		Good. Dry. Red stem, white skin. 10-12 months. Can be grated without peeling, you just must top and tail it. (18)		18
43.	Voadeira	**G**	black		Black root, 14-15 months. (1,2) The most resistant to white fly (8)	Introduced into various regions in Bahia (8)	1,2,8,19

AIPIMS **OF THE** ***AGRESTE*** **OF ALAGOINHAS**

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
1.	Aipim Abacate		black				1,2
2.	Aipim Abóbora or Aipim Abroba		black (10) orange/ yellow (18)	Boiled.	(Note: Farmers 10 and 18 appear to be describing different *aipims.* Farmers *10* had only recently settled in the area, so the description given by farmer 18 is more likely to be generally applicable to the area) You have it with coffee. Black root, inner skin pink, flesh very white, (my obs in *roça* 10) Problems with *podridão.* Young leaf very dark. Stem pale red. (10) Young leaf green, root slightly yellow, inner skin pink. 10-12 months. (18)	Farmer 14 says it comes from Sergipe. 13 used to grow it but no longer does.	10,18,13,14
3.	**Aipim Caboquinho**		black	*goma*	'One of the best for *goma*'		19
4.	Aipim Cacau		'red', black (18)		Dark red stem. Young leaves green. Outer skin black, inner skin red. 10-12 months. (18) Yellowish, skin reddish (16)		1,2,4,18,19, 16.
5.	Aipim Eucalipto		black	Frying	It can be fried without boiling.		1,2,
6.	Aipim Manteiga		red (19)	*farinha, tapioca (10)*	Root is yellowish. 6 months. (10)		1,2,4,10,19.
7.	Aipim Periquita		black				1,2

No	Variety	G/R	Colour of root	Uses	Notes	History	Sources
8.	Aipim Prato Cheio		white		Farmer 19 grows it in his *quintal* (garden)		19
9.	Aipim Preta		black				1,2
10.	Aipim Rosa or Casco de queijo		pink		Agronomist 2 does not know it.	Also known as *Casco de queijo*(4) Farmer 13 disagrees.	4,13
11.	Aipim São José		black		'Flesh is white, white, white' . The root is a bit grey – dark. The stem is greyish (18) (striped – my obs.) The inner peel is reddish (18)		18
12.	Maciel		white		Good one (16)		16
13.	Pão		black		Yellowish		16
14.	Trisuma				Similar to *Cravelinha* although it is an *aipim*. Good flavour. (16) It can be bitter at times (17)	'I no longer have it because I am a widow' (22) 'It's finished' (17)	3,16,17.19, 22..

Note:

Column 3 – G – varieties confirmed growing **R –** varieties remembered

Fontes:

1 G. Agronomist
2 J. Agronomist
3 Dona I. (Mandacarú)
4 Dona T. (Mandacarú)
5 Seu Z. (Mandacarú)
6 Agronomist 1- EBDA Inhambupe
7 Agronomist - EBDA Alagoinhas
8 Agronomist 2 - EBDA Alagoinhas
9 ZE - Inhambupe
10 Dona E e Seu R. (Assentamento Moita Redonda)
11 STR Inhambupe

12 Dona ME (Inhambupe)
13 Dona A. – Formoso
14 Dona V. – Formoso
15 Dona MP. – Formoso
16 Farinha makers
17 Seu D. – Crisópolis
18 Dona D. – Alagoinhas
19 Seu JC - Catuzinho
20 E. – COOPERA
21 Teacher, Escola Familiar Agícola
22 Dona M. - Formoso

APPENDIX 2A

Population of Pará 1940-1991

POPULATION OF PARÁ 1940-1991			
	Urban	**Rural**	**Total**
1940	286.865	657.779	944.644
1950	389.011	734.262	1.123.273
1960	614.973	914.320	1.529.293
1970	1.021.966	1.145.052	2.167.018
1980	1.667.356	1.736.035	3.403.391
1991	2.596.388	2.353.872	4.950.260

APPENDIX 2B

Population of Bahia 1940-1991

POPULATION OF BAHIA 1940-91			
	Urban	**Rural**	**Total**
1940	937.571	2.980.541	3.918.112
1950	1.250.507	3.584.068	4.834.575
1960	2.032.922	3.887.525	5.920.447
1970	3.085.483	4.407.987	7.493.470
1980	4.660.304	4.794.042	9.454.346
1991	7.016.770	4.851.221	11.867.991

Sources:

For 1940-1980:
National census data published in 'Estatísticas Históricas do Brasil 1550 - 1988.' IBGE
For 1991 Census data published in 'Anuario Estatístico do Brasil 1994'. IBGE.

APPENDIX 2C

Production of manioc (and population) in Pará 1940-1996

Production of manioc in Pará *(Millions of tons)*		
Year	Population	Manioc
1940	**944,644**	
1950	**1,123,273**	
1960	**1,529,293**	*(0.834)*
1970	**2,167,018**	
1980	**3,403,391**	
1981	3,525,300	
1982	3,675,000	1.682
1983	3,824,500	1.675
1984	3,974,800	1.645
1985	4,125,300	*1.904* *(1.838)*
1986	4,274,000	2.315
1987	4,419,500	
1988	4,561,400	1.909
1989	4,699,600	2.608
1990	4,833,800	
1991	**4,950,050**	2.968
1992	5,090,300	2.627
1993	5,212,800	
1994	5,332,200	
1995/6	5,448,600	*(1.366)*

Sources:
IBGE Estatítisticas Históricas (1988), 1960 census and 1995/6 agricultural census.

Notes:
1. Not all data has been possible to access - thus the blanks
2. Population census figures in bold. Agricultural census figures in italics.
3. 1960 census:

- *Aipim* (sweet manioc) 8.493 tons
- *Mandioca* (bitter manioc) 821.909 tons

APPENDIX 2D

The production of manioc (and population) in Bahia 1940-96

PRODUCTION OF MANIOC IN BAHIA (Millions of tons)		
Year	*Population*	*Manioc*
1940	**3,918,112**	
1950	**4,834,575**	
1960	**5,920,447**	*(2.177)*
1970	**7,493,470**	
1980	**9,454,346**	4.880
1981	9,646,200	
1982	9,878,200	4.439
1983	10,111,600	4.219
1984	10,346,000	4.557
1985	10,580,800	5.317 *(2.009)*
1986	10,813,000	5.421
1987	11,040,000	
1988	11,261,400	3.440
1989	11,477,100	4.339
1990	11,686,500	
1991	**11,867,991**	4.241
1992	12,086,900	3.770
1993	12,278,000	
1994	12,464,300	
1995/6	12,646,000	*(*0.870)

Sources:
IBGE Estatítisticas Históricas (1988), 1960 census and 1995/6 agricultural census
Also CEPA/Bahia 1983 (State government of Bahia) for 1980 figure.

Notes:

1. Not all data has been possible to access - thus the blanks
2. Population census figures in bold. Agricultural census figures in italics.
3. 1960 census

- *Aipim* (sweet manioc) 145,736 tons
- *Mandioca* (bitter manioc) 2.031.470 tons

APPENDIX 2E

Production of Brazil's main food crops: 1940-1998

Production of Brazil's main food crops: 1940-1998							
Year	**Population (m)**	**Production (Millions of Tons)**					
		Manioc	***Maize***	***Beans***	***Rice***	***Soya***	***Wheat***
1940	***41.165***	7.332	4.876	0.767	1.320	-	0.102
1950	***51.942***	12.532	6.024	1.248	3.218	-	0.532
1960	***70.070***	17.613 *(15.442)*	6.681 *(8.374)*	1.731 (*1.420*)	4.795 (*3.762*)	0.216 (note 5)	0.713 (note 6)
1970	***93.139***	29.464	8.672	2.211	7.553	1.509	1.844
1980	***119.003***	23.466	20.372	1.968	9.776	15.156	2.702
1985	*131.978*	23.125 *(12.432)*	22.018 *(17.774)*	2.549 *(2.293)*	9.025 *(8.986)*	18.279 *(16.730)*	4.320 *(3.824)*
1990	*144.724*	24.285	21.341	2.233	7.419	19.888	3.093
1991	***146.825***	24.538	23.624	2.745	9.488	14.938	2.917
1992	*149.358*	21.918	30.506	2.799	10.006	19.215	2.796
1993	*151.572*	21.865	30.004	2.479	10.143	22.558	2.153
1994	*153.726*	24.452	32.487	3.368	10.500	24.912	2.092
1995	*155.822*	25.316	36.275	2.946	11.226	25.651	1.534
1996	**157.070**	24.584 *(9.099)*	32.185 *(25.512)*	2.822 *(1.916)*	9.990 *(8.077)*	23.562 *(21.651)*	3.359 *1.433)*
1997	163.700	24.305	34.601	2.991	9.290	26.431	2.441
1998		19.809	29.297	2.184	7.796	31.357	2.222

Notes for Table 2-4

1. Population census, conducted every 10 yrs. and the head count undertaken in 1996 are given in bold type. Other figures are IBGE estimates.
2. Agricultural census data is given in parentheses (where figures have been accessed). The 1985 and 1995 results are presented in table 2-5 below.
3. The figures for production up to 1985 given in this table are those given in the overview offered in IBGE's *Estatísticas Históricas do Brasil* published in 1988.
4. In the 1960 census, production of sweet and bitter manioc was counted separately. The total recorded production of *aipim* (sweet manioc) was 6.529m tons and of *mandioca* (bitter manioc) was 8.912m. tons. In subsequent censuses, *aipim* and *mandioca* production was not differentiated, the assumption being that the production figures were recorded as an aggregate. I have been unable to confirm whether they were differentiated in censuses prior to 1960.
5. Figures for maize, rice, beans, soya and wheat for 1990,93,94 and 98 were taken from FAO's website on 5 August 1999. It is assumed that FAO's source is IBGE.
6. In 1960, soya production was mainly in the south of the country. IBGE did not publish data for soya production in the 1960 census. It may have been contemplated under the category of 'other temporary crops'.
7. 1n 1960 wheat production was almost exclusively in the south of the country although there was a tiny production in Bahia. I did not access the census figure for wheat for this year.

APPENDIX 2F

Production, area and yield of Brazil's main national food crops (temporary crops (*lavouras*) 1985 and 1995/6 censuses

Crop	Production		Area Harvested		Yield	
	Metric Tons		Hectares		Kg/Ha	
	1985	*1995-1996*	*1985*	*1995-1996*	*1985*	*1995-1996*
Rice	8.986.289	8.076.751	5.173.330	2.989.209	1.737	2.702
Beans, 1st harvest	2.066.556	1.450.581	5.480.286	4.085.661	377	355
Beans,2nd harvest	162.706	464.996	435.289	728.627	373	638
Manioc	12.432.171	9.099.418	1.635.594	1.234.489	7.601	7.371
Maize	17.774.404	25.511.987	12.040.441	10.603.646	1.476	2.406
Soybeans	16.730.087	21.650.696	9.434.686	9.478.823	1.773	2.284
Wheat	3.824.288	1.433.116	2.518.086	893.555	1.519	1.604

Source: IBGE 1999. Results from the Census of Agriculture 1995-96.

APPENDIX 2G

Changes in manioc production in the main producer states of Amazônia, North-east and South: 1985-19995/6

Changes in manioc production in the main producer states of Amazônia, Northeast and South: 1985 to 1995/6						
	Production (metric tons)		**Area harvested (has)**		**Yield (kg/ha)**	
	1985	**1995-96**	**1985**	**1995-96**	**1985**	**1995-96**
AMAZONIA (NORTH)						
Roraima	16.145	25.246	2.278	4.132	7.094	6.110
Acre	63.769	124.841	8.262	13.892	7.775	8.987
Amazonas	744.58	843.595	79.862	90.732	9.323	9.298
Amapá	36.269	22.314	4.905	2.456	7.394	9.086
Pará	1.837.744	1.366.070	200.419	154.916	9.170	8.818
Rondônia	69.520	53.569	11.361	5.374	6.119	9.968
NORTHEAST						
Maranhão	807.107	584.731	148.736	107.489	5.426	5.440
Piauí	213.206	215.626	39.979	37.158	5.333	5.803
Pernambuco	686.555	296.102	109.285	54.311	6.282	5.452
Bahia	2.009.198	869.635	294.201	211.402	7.135	4.114
SOUTHEAST AND SOUTH						
Minas Gerais	446.241	311.497	97.752	67.532	4.565	4.613
Paraná	930.207	1.437.760	69.600	110.958	13.365	12.957
São Paulo	356.861	207.764	27.517	19.409	12.969	10.705
Sta. Catarina	unavailable	unavailable	63.370	56.429	unavailable	unavailable

Source: IBGE agricultural census 1995/6. (from IBGE website, August 1999)

APPENDIX 3A (ref. Chapter 3)

Early criteria for case study site selection in Pará

	Community/Area 1	Community/Area 2
a	Less forest disturbance than area 2.	Largely deforested land
b	Producing M. and M. products for the local market and for subsistence (ie. not for use in the capital city). Main production figures unlikely to feature in IBGE's statistics.	Producing M. and M. products for the regional or national market - thus integrated into the wider market economy. Some subsistence production. Main production figures likely to be incorporated into IBGE's statistics.
c	Community has been more or less stable for more than 40-50 years. (i.e. there are plenty of older people have been there for at least this length of time).	Community has been more or less stable for at least 40 years. (i.e. there are plenty of older people who have been there for at least this length of time).
d	Farmers have received little or no appropriate agricultural extension support and advice from relevant institutions.	Farmers have received fairly regular agricultural extension support and advice from relevant institutions.
e	Landholdings many but small although most families will not have title to their land and may be *posseiros*, share croppers etc. Most people work their own land.	Concentration of agricultural lands owned by few people. Many rural labourers with small plots of land for personal use.
f	Lower levels of biodiversity and cultural losses regarding cultivation and uses of M.	High levels of biodiversity loss and loss of popular memory regarding the cultivation and use of M.
g	Originally migrants from region (y).	Originally migrants from region (x)

APPENDIX 3B (ref. Chapter 3)

Early criteria for case study site selection in Bahia

	Community/Area 1	Community/Area 2
a	Semi-humid south east	Semi-arid *sertão*
b	Producing M. and M. products for the regional or national market - thus integrated into the wider market economy. Some subsistence production. Main production figures likely to be incorporated into IBGE's statistics.	Producing M. and M. products for the local market and for subsistence (ie. not for use in the capital city). Main production figures unlikely to feature in IBGE's statistics.
c	Community has been more or less stable for at least 50 years. (ie. there are plenty of older people who have been there for at least this length of time).	Community has been more or less stable for most of the twentieth century despite heavy migration to the cities of the south but there are plenty of older people have been there all their lives.
d	Farmers have received fairly regular agricultural extension support and advice from relevant institutions.	Farmers have received little or no agricultural extension support and advice from relevant institutions.
e	Concentration of agricultural lands owned by few people. Many rural labourers with small plots of land for personal use. (ie. probably less than 10 has. of land)	Landholdings many but small (less than 2 has.) although most families will not have title to their land and may be *posseiros*, share croppers etc. Most people work their own land.
f	A balance of generations still resident in the community - young and old.	Probably a majority of older people living here. (not too sparsely populated)
g	Culture may be little documented	Historically and culturally rich area

APPENDIX 3C (ref. Chapter 3)

Bahia Area 1:

Comparing and contrasting early site selection criteria with actual sites selected

	Early selection criteria	Characteristics of site selected
a	Semi-humid south east	Semi-arid Mata do Cipó – South West
b	Producing M. and M. products for the regional or national market - thus integrated into the wider market economy. Some subsistence production. Main production figures likely to be incorporated into IBGE's statistics.	**Identical** Producing M. and M. products for the regional or national market - thus integrated into the wider market economy. Some subsistence production. Main production figures likely to be incorporated into IBGE's statistics
c	Community has been more or less stable for at least 50 years. (ie. there are plenty of older people who have been there for at least this length of time).	Similar **(only with multiple communities)** Communities have been more or less stable for at least 50 years despite heavy permanent and seasonal migration to São Paulo. (There are plenty of older people who have been there for at least this length of time).
d	Farmers have received fairly regular agricultural extension support and advice from relevant institutions.	Farmers have received very little agricultural extension support and advice from relevant institutions.
e	Concentration of agricultural lands owned by few people. Many rural labourers with small plots of land for personal use. (ie. probably less than 10 has. of land)	Land tenure mixed. Mostly medium to small land-owners and landless labourers.
f	A balance of generations still resident in the community - young and old.	***Identical*** A balance of generations still resident in the community - young and old.
g	Culture may be little documented	***Similar*** Local history and culture little documented
h		*Farinha* sold to regional and state market. Root-manioc sold to Conquista for *goma/biscoito* production. Domestic production of *goma/biscoitos.*

APPENDIX 3D (ref. Chapter 3)

Bahia Area 2

Comparing and contrasting early site selection criteria with actual sites selected

	Early selection criteria	Characteristics of site selected
a	Semi-arid *sertão*	*'Litoral Norte' (Agreste* of Alagoinhas)
b	Producing M. and M. products for the local market and for subsistence (ie. not for use in the capital city). Main production figures unlikely to feature in IBGE's statistics.	Producing M. and M. products for the local and regional markets. Some subsistence production. Main production figures do feature in IBGE's statistics.
c	Community has been more or less stable for most of the twentieth century despite heavy migration to the cities of the south but there are plenty of older people have been there all their lives.	Multiple communities. Stability of rural families variable. Fairly heavy rural-urban migration within the region and to São Paulo. Still plenty of extended families (including older people) that remain stable.
d	Farmers have received little or no agricultural extension support and advice from relevant institutions.	Many farmers have received agricultural extension support and advice from relevant institutions.
e	Landholdings many but small (less than 2 has.) although most families will not have title to their land and may be *posseiros,* share croppers etc. Most people work their own land.	Most people work their own land to which they have title. Small-medium sized landholdings alongside much larger estates.
f	Probably a majority of older people living here. (not too sparsely populated)	Fairly densely populated.
g	Historically and culturally rich area	Local history and culture little documented.
h		*Farinha, beijú* and other products of M. for local and regional market.

APPENDIX 4A

MAKING FARINHA IN ESTRELA, RURAL CAPIM

Retiro - Seu S.

Seu. S. is an enterprising and thoughtful farmer. His home area, Estrela, is only about 15 kms. from Capim town but is set back about 2-3 kms. from the main road. Several other farmers in the region had heard of his experiments with a variety of manioc ,'*Maranhense*', which looked as though it was proving resistant to one of the main diseases in the area, *podridão* (*Phytophthora* - root rot). Unlike many other relatively large-scale producers of *farinha* in Capim, S. took pride in making quantities of good quality *farinha de 3 dias* for which he would earn a better price on the market. His *retiro* was 3 or 400 metres from the family house. It was an open structure with no walls. Timber pillars supported the timber beams and the roof consisted of clay tiles, the coolest and most hygienic of roofing materials. Although the tiled roof would be considered 'modern' and in contrast to the more traditional thatched roof, only the motor distinguished this *retiro* from those in Bacá, Gurupá – and, indeed, those of several indigenous peoples (ref .Carneiro, etc). S. was using a gas-powered motor to grate his manioc. Yet he still used a *tipití* to squeeze out the moisture, not the more advanced press.

S. was using *both puba* or *mandioca mole* - manioc which has been soaked for a few days - *and mandioca seca* - or 'dry' manioc, which is peeled and grated without having been soaked. The proportions of *puba* to *mandioca seca* vary slightly but S. was using more than the customary amount of *puba*, at an approximate ratio of 60:40 or 65:35.

Soaking

S. would soak manioc roots either in the nearby stream or in a large tank of water in his *retiro*. When the roots are soaked in the stream he will leave them there for 5 days. The stream used here is tidal, which means that the manioc can only be removed at low tide. S. considers this to be a restriction. On the morning of my visit, S. himself was taking the roots out of the stream and removing the peel. The peel is thrown into or beside the stream and the soggy roots are rinsed and placed in a basket or aluminium basin, to be carried the short distance back to the *retiro*. The sodden mass of damp roots is then placed in a *cocho* or large wooden table that is built up at the edges. In S.'s *retiro* his large *cocho* slopes slightly downwards toward the grater, through which a mixture of dry roots and wet pulp will be fed. The soft, wet roots have by now lost much of their poisonous HCN, which the dry roots have not.

Roots may also be soaked in the tank closer to hand in the *retiro* for just 4 days. The resulting 'four day *farinha*' is considered superior in quality to the *farinha* made from manioc soaked for 5 days - which, incidentally, is not referred to as five-day *farinha*.

Three-day *farinha* is considered even better but takes longer to make. This is because it requires more labour to process as it is peeled before soaking.

Dry roots

S.'s manioc is brought to the *retiro* from the *roça* by either horse or mule. The panniers (*casua*) are slung on either side of the animal's padded saddle and are piled high with roots. When they reach the *retiro* the roots are dumped in a heap on the earth floor to await peeling. It is the women who are the great peelers and scrapers of manioc although on the day of my visit a young man was also being paid to help. My companion from the rural workers' union sat on a log and, as we chatted, she peeled. The peeled roots were piled back into the panniers and were later rinsed clean in water in a large plastic bin like a dustbin before being thrown into the *cocho* together with the wet roots.

Grating

The mixture of peeled, dry roots and the damp mass of the *mandioca mole* are fed by hand past the gyrating cylindrical metal grater. The resulting damp mass falls into another *cocho* - this time a broad, concave timber receptacle a little longer than one metre in length. This grated mass must then be dried before being toasted on the *forno.*

This *cocho* was similar to those used in many other *retiro*s throughout Brazil - past and present. A rubber belt driven by a gas-powered motor in turn drives the grater. In this *retiro* the belt stretched for about a metre between the grater and the motor.

Drying the mass

The damp, grated mass is taken from the *cocho* and stuffed into the *tipití.* S. was using two *tipitís* because of the relatively large volume of manioc that he was processing. As in other *retiro*s where this ancient technology is used, the mass is squeezed and then drains for about 20 minutes.

In this *retiro* there is no production of *goma*, or starch, so the liquid that drains from the manioc mass is allowed to flow away. Should the women of the household wish to make some *goma* with which to make *tapioca*, they would simply collect some of the liquid draining from the *tipití* and allow the starch to settle before draining off the liquid. There are two main reasons why S. and his family are not very interested in making *goma*. First, they

are very fully occupied making *farinha* for the market and the women who would make the *goma* have no spare time to do this, and little interest. The other reason not to make *goma*, S. explained, is that the best kind is made when there is a high proportion of dry roots used or when only dry roots are used. This suggests that when the roots are soaked for days, not only the poison is washed away, but some of the starch content of the root is also removed.

Sieving the dried mass

Once the mass has been squeezed in the *tipití* it is sieved once to separate the compacted mass and to remove any remaining fibres. It is now ready for toasting on the *forno*.

The forno and the forneiro – toasting the flour

The round iron griddle or *forno* was approximately 1.5 metres in diameter and stood about 75cms high. It was supported on a round wall of clay bricks. A total of 7 people were working there during the morning of our visit. There were 4 women, one of whom was S.'s wife, whose main work was to peel the manioc. The other 3 women were being paid for their work.

The one specialist job here, as elsewhere, is that of the *forneiro*. The stirring of the *farinha* on the *forno* is skilled work. Both in Pará and in Bahia it is nearly always performed by men, usually young men, for whom the work is a profession. The male owner of a *retiro* (or *casa de farinha*) always knows how to undertake this work but he will delegate this arduous work whenever economic circumstances permit or where there is a young man in the family. The colour and final texture of the final product is very much determined by the level of skill of this worker. *Farinha* must be moved around on the *forno* constantly, without ever more than a few seconds interruption, and for as long as is necessary to produce the required result. Hesitation or lack of concentration could result in lumpy or unevenly coloured *farinha*. The wooden tool used for stirring is a long handled paddle called a *rodo*. In this *retiro*, the *rodo* was made of the very light-weight wood, *marupa* (*simarouba amara)*.

The timing varies from place to place and even from day to day. Essentially it depends on how damp the manioc mass is and the desired characteristics of the final product. The timing is determined by the following criteria:

- The variety or varieties of manioc used as some take longer to dry on the *forno* than others.
- The proportion of dry, grated manioc to soaked roots (*puba* or *mandioca mole*)
- How many times the mass has been washed.
- The type and amount of timber used to fuel the *forno.*

The timing therefore depends both on how long the mass takes to dry and then to crisp or toast and on the type of fire and *forno* that is used to do this job.

In this *retiro*, on the morning of our visit, the *farinha* was being tossed and stirred for about one hour. Before the first toasting the *forniero* selects the timber for the fire and lights it about 20-30 minutes before adding the first load of *farinha*. In this *retiro* the logs were about one metre long and between 5-10 cms. in diameter. Some had been brought from fields which had been cleared by fire and were therefore charred on the outside. It takes four horse or mule-loads of wood to make 8 *sacas* (480 kgs.) of *farinha.* The logs are carried on the horse's back and secured to the padded saddle on either side with a simple wooden structure - an upturned double 'V' linked at the apex by a single bar.

S. used a copper *forno*. It seems that the *farinha*-makers who are committed to making the finest *farinhas* favour copper. S. inherited his *forno* from his grandfather who had bought it from another family when S. was still a boy. It had been mended by S.'s cousin about 20 years previously. 'This *forno* will last 100 years - the iron ones only last 10-15 years'. S. told me that copper *fornos* are no longer manufactured but that you would pay R$800-900 for a second hand one even if it needed repair. But the *forneiro* warned that a mended iron *forno* is bad to use, since the *rodo* tends to catch on the rivets.

So the *forneiro* pushes and pulls the *farinha* on his *forno*, occasionally tossing it high with a dramatic gesture to allow the fine powdery starch to blow off. He tastes the *farinha* from time to time and adjusts the heat of the furnace - probably with the help of another man - by adding more fuel. Then, when the *farinha* is just right, with no warning it is suddenly and quickly removed from the *forno* and, in this *retiro*, piled at one end of a large and deep wooden trough where it is left to cool. And the *forneiro* still does not stop work. Immediately another load of damp *farinha* is loaded and the process recommences. During the very busy period of *farinha* making, two or three days before market day, the *forneiro* starts work in the early hours of the morning before dusk, at around 3 or 4 am, and will work through until 8 at night. Senhor S. paid his man a little more than the minimum wage, but in other *retiro*s in Capim, *forneiros* were receiving just the minimum wage for these long hours of work.

A little later in the process the toasted, dry *farinha* was sieved through a locally made square flat sieve and moved from one end of its trough to the other. This sieving removes any impurities or lumps. The *farinha* is then allowed to rest for a while - but never too long - before being bagged ready for transport.

APPENDIX 4B

MAKING FARINHA AND TAPIOCA IN BACÁ: MAY 2002

In Bacá, Gurupá, *casas de farinha* are called *retiros* or *casas de retiro*. This name implies a place to which people retire.

There is only one community in the municipality, Nossa Senhora de Nazaré ,in which there is a *caetitú,* a diesel-powered machine for grating manioc. In Bacá *farinhas, beijús, farinha de tapioca* and various other starches and foods were made using manual methods. Every family in Bacá was making these foods and either had their own *retiro* or shared one with neighbours or members of their extended family. All the *retiros* I visited were simple, very small places, yet were minutely organised and required a degree of fore-planning to function effectively and efficiently. Some were exceedingly simple and were in the *roça,* far from the owner's house. The sustenance of the family depended on the output of these cottage industries and on their level of organisation.

Farinha and other foods destined for the local market place had to be made by the end of Wednesday and Friday nights and be ready to carry to market in Gurupá town the following morning at dawn. Men, women and children all had their distinct roles in the work yet, after living with these people for some time, it became clear to me that a senior woman within the household had quietly assumed responsibility for organising production and ensuring the efficient running of the small industry. One of the female roles that I found interesting was that of determining the quantity of *farinha* and the variety and amount of other foods that were being produced in the *retiro*s of the community.

The family started work at 7am. They made *farinha* twice a week, on Wednesdays and Fridays because the market in Gurupá town is on Thursdays and Saturdays. The weekly rhythm of work is unending.

They said that manioc needs to soak for 4-6 days. They would usually place it in the stream to soak on the Monday for use on the Friday. Today, they were using the manioc that had been put to soak on Monday.

The *casa de farinha (retiro*) has a thatched roof and an earthen floor. Dona L. says it is 2 years old. Before that they made *farinha* in her brother in law's *retiro*. I joined them a little after 7am and the family by which time the family was already working hard. L. was there

with her grown-up daughter, two grown-up sons and a young boy. At that time, in the early morning, L.s husband was not there. He was possibly in the *roça* and arrived later.

L. was using two varieties of manioc that morning (to grate dry): *folha estreita* (white) and *carrazedo* (yellow), both being harvested at 17 months. L. told me that the roots are small at the edge of the *roça* and large in the middle. They had been peeled the evening before.

She described *mandioca mole* or soaked manioc as nice and yellow. The varieties that had been left to soak were : Amarelinha - yellow, Peixe Boi - 'whiter', good for *tapioca* and with a pink inner skin and Abacate - a bit whiter - yellowy, she said.

Process

There were basically two processes taking place. There was the washing and squeezing of the *mandioca mole* that had been soaked in the river and there was the grating etc. of dry manioc (some of which had been peeled the night before).

On the *masseira*:

- The roots are grated.
- They are washed to remove the starch with water from the river.
- Dona L. wrings the mass out by hand, saying that her hands hurt from doing this.
- Now, she declares, 'it is washed and the *tapioca* (starch) has been removed.
- It is then sieved.
- Then it is squeezed dry in the *tipití*.

The mass is left for only about 15 minutes in the large *tipití*. Around 2-3 litres of *tucupí* will have drained off. This was thrown out, far from the pigs and hens which would die if they consumed it. The dry mass, the contents of the *tipití*, was now emptied out (in cylindrical pieces) onto the *masseira*, or hollowed out trunk, that served as a working bench.

E., the young woman, now sieved this dry mass by hand through a rough sieve made from the mesh of a car radiator filter (*crivo*)**.**

A., on of the young men, placed some *mandioca mole* onto the *masseira* and kneaded it so as to break it down and to expel some of the water. On the work bench, this kneading took place next to the grated, washed mass. The *m. mole* was brought up from the river by the young boy in a plastic bucket. I noted that no peeling of the manioc was done this morning

because the 'dry' manioc had been peeled the evening before ready for grating. It was left in the river in sacks over night to stop it going black - and going off.

The *masseira* was about 5m. in length, similar to a canoe. It is effectively their work bench.

From left to right (the right end being the one that is nearest to the *forno*)

1. Oblong tin can with water - dirty with *tucupí* from hands.
2. Heap of manioc roots - 2 varieties.
3. Grater. Dona L.'s son, D., was grating with one hand. The *tucupí* collected in the bottom of the *masseira.*
4. Grated mass. Here L. washed the mass in a large gourd (*cuiá),* wrung it out, and placed it on the *masseira.*
5. Washed mass.
6. Mixed mass - a mixture of *massa lavada* (washed mass) and *mandioca mole*. A. was making a mixture of *massa lavada* and *mandioca mole*, mixing it with his hands. He used more of the *massa lavada* than *mandioca mole*.
7. This mixed mass was loaded from here into the *tipití*.
8. *Massa secada* - cylindrical pieces from the *tipití.*
9. Sieve: E. and the boy rubbed the mass through the sieve. The result was a palish yellow *'massa seca peneirada'*. It was now ready to be loaded onto the *forno* for toasting.
10. Under the end of the *masseira* was a plastic basin with *crueira* (the fibre remaining in the sieve after sieving) that is given to the pigs and hens.

Toasting the farinha

Timber was placed in the *forno* a little while before it was needed to allow it to heat. The two young men did this work.

D., the other young man, said that the *farinha* that they were making today was 'white' but that if it were being made with the *carrazedo* variety it would be yellower. (1b:79).

Today, the *farinha* they made was *farinha fina* - fine. If they had wanted to make *farinha* more '*grossa*' or rough, it would have had to spend less time in the *tipití* and thus be wetter.(1b:80)

Making tapioca

The process was as follows:

- Wash the *tapioca*: leave the liquid bearing the fine *tapioca* sitting in a big aluminium basin for 7-8 hours. The water is then removed and replaced and the mixture left for another several hours and covered with a cloth.
- Dona L. then removes the *tapioca* from the basin on Friday. She will leave it in the sun for 2 hours. But when it rains she covers it with a cloth to absorb the excess moisture and when this becomes wet replaces it with another dry one - and so on. She says that it is very time-consuming to dry the tapioca in this way.
- As I watched Dona L. making *tapioca*, I took the following notes.

> 'She stirs it around the big basin with her hand and then creates the *bolinhos* (tiny globules) from the fine, slightly damp, powdery mass by rubbing it (the near-dry, once-sieved *tapioca*) systematically with thumb and forefinger. It is in a big aluminium basin - she talks about making *bolote* (*or bolinhos*). These are the minute round particles of which the *tapioca* consists - the process that I helped with. Then it is passed through a square sieve for the second time. It is very time-consuming. When the *farinha* is done (on the *forno*), the boys move away and their father, who has now arrived, moves the *farinha de tapioca* on the *forno*. He moves it around with the *açaí* brush (made from the branch of an *açaí* palm after the fruit has been removed), making *bolinhos*, then Dona L. throws the *tapioca* into the air, allowing it to drop from high onto the *forno* thus allowing the fine powder to disperse. When all the *tapioca* is on the *forno*, Dona L. helps her husband move it around.
>
> Neighbours come and go as do chickens and pigs.
>
> The finished *farinha* goes into the *masseira* to cool and then goes into the 'Margarett tubs' (plastic margarine tubs).
>
> They finished making the *farinha* by 14.10h. The *tapioca* took an hour or less to dry on the *forno.*
>
> They made 4 latas de *farinha* that day. (But also *tapioca* and *beijús*).'

The family – and technological change

Dona L.'s mother is in Gurupá and her father is J.R., a local man. Dona L. learned how to make *farinha* from her mother. Dona L. is 53 - born in Bacá. She is a *comadre*, the godmother of one of the children of my hosts in the community and thus very close.

I asked what changes there had been. The following items are the same now as when she was small, she said: the grater, sieve, gourd, tin and aluminium basin.

The *forno* was different in those earlier days. It used to be round and made of copper. Her mother had sold the round *forno* to a man in another community. Her father's *forno* is now with a female cousin. She says they do not sell copper *forno*s any more - but she prefers hers (oblong) - she says it is easier to use.

The whole family would go into Gurupá town with *Papai* (Father), except L. They often have some *farinha* to sell and some for their own consumption. They can earn $R12 the *lata* (20 litres) or 60 cents per litre. Elena explains that they sell in the street outside the market and, when it rains, inside. This is on Thursdays and Saturdays. They store the *farinha* in plastic sacks and margarine buckets.

It is *Papai* who controlled the money of the household, according to L. However, it was my observation that Dona L. controled the *casa de retiro*. All members of her family were specialists in the various tasks, but it is she who was the central organiser for the process. It was also she who decided how much produce should be made. Her husband took greater responsibility for the *roça.* Also, I observed that *beijú* seemed to be women's work.

When they employed someone to help with the weeding in the fields, they would pay them $R5 to work up 'til 11am. Sometimes Dona L. asked a woman to help her make the *beijú* - and would pay her in kind with *beijú*. If they made 4 *latas de beijú*, she would keep 2.

There was no collective *casa de farinha* in Bacá, but you could pay someone to help you, either in cash or in kind.

Something else that Dona L. said was that when an older woman retired (she may have been referring to her mother), she would (or could) pay another <u>woman</u> to do the weeding for her in the *roça.*

A contemporary note on this day's work for me, the student

The work is back-breaking, tiring and extremely hot. I am much taller than Dona L. and her family and the *masseira* and the *forno* are very low for me to work on - thus I was bending over a lot. I think that I left at about 1pm - glad of the excuse to go when my hostess called me to lunch , after which I slept a siesta, shattered. The day's work for Dona L. and family finished around 4pm.

As with any small industry, the *retiro* requires inputs, capital equipment, tools and labour. Here is a brief description of these elements of one of the family *retiro*s visited which is representative of others in Bacá. This *retiro* was a thatched structure with no walls, supported by timber posts with a floor of impacted earth. The dimensions were approximately 7x5 metres. The structure is reminiscent of the houses of many forest indigenous peoples. The *retiro* contrasted to most of the dwelling houses in the community that are constructed of timber, raised on stilts, and have external and often internal walls of timber.

Capital equipment and tools

The most important fixture in the *retiro* was the *forno*. The *forno* in this *retiro* was unusual in that, instead of being round as they so very often are, it consisted of a flat, rectangular base, measuring about 2.5x0.7 metres. The vertical edges were about 10cms. high and made from andiroba (*Carapa guianensis*). This steel griddle had cost the family R$75 two years earlier, which was when they had set up their own *retiro* right next to their house. Before that, they had made *farinha* either in the *roça* or in the *retiro* of a relative who lived nearby.

The *forno* was raised from the ground on a kind of low wall, about 70cms. in height, of wattle and daub made from two layers of vertical sticks (*pau de rego*) which were woven together with a vine and packed with mud. The structure must be left to dry for two weeks before the *forno* can be placed on top. Fire wood was fed into the cavity below the *forno* from a gap at one end.

On either side of the *retiro* was a *masseira* which was effectively a workbench. One of these, about 5m in length was hollowed out, like a canoe (some people used old canoes for this purpose). The other was flat, much more like a table. The long, hollow *masseira* in this *retiro* was made from *cupiuba* wood (*Goupia glabra)* and cost the family R$30 the previous year.

A little way outside the house was the tall, robust, vertical timber structure with a horizontal beam from which the *tipití* was hung and then stretched to squeeze the damp, grated manioc or the mass of starch when making *beijú* or *farinha* de tapioca. In this *retiro*, the poisonous liquid simply drained away into the ground. Pigs and tiny chickens had to be kept away from the poison but hens pecked away at it with no ill effects.

Beyond the end of the *retiro* in which the *forno* stood was a small, rough thatched structure in which timber was stored well above the ground.

Tools and other equipment included the following items, some of which were similar or identical in design to those that would have been used hundred of years ago. Other items were the product of an industrial age.

- ***Peneira*** - sieves in this *retiro* were of two kinds. One traditional type *crivo* was a square finely woven sieve used in the making of starch-based food. A pair cost R$7. The other, which was rectangular on a heavy wooden frame with a fairly thick steel mesh, was more robust and was used in the making of *farinha*.
- ***Ralador*** – this was a grater made from the metal of a metal drum.
- ***Cuias*** - gourds of various sizes in which to wash the manioc mass and scoop water.
- ***Paneiros*** - various types of baskets. One type, used to transport manioc roots from the *roça*, was of fairly open weave at the base and more closed around the sides. Others used for carrying roots a short distance might be roughly made and of open weave. They might cost R$1 to purchase, but the man of the house made these. These were made from a vine known as *chichica* or *chimbuí.*
- ***Tipití*** - This was a long, closely woven tubular devise used for squeezing the poisonous liquid from the grated pulp of *manioc*. This family owned at least four *tipitís*. Although they were all basically of the same design, some were fatter and longer than others for making *farinha* and other smaller ones were used to squeeze the mass when making *beijús*. The weave of those used for making for *beijús* was a little finer. Some were green, others brownish. They are made from green or dried *arumã* (*Ischnosiphon arouma).*
- ***Lata*** - this important item of equipment was a plastic margarine tub with a lid which could be purchased for R$3-5 locally. Its main function was as a water-tight container in which to store *farinha* for home use and in which to transport it to Gurupá town for sale. It was also a measure of quantity for *farinha* specially and also for some of the small

beijús. I have heard this tub described more literally as a *balde de manteiga*, a butter bucket.

- ***Lata (*metal) -** this type of large, rectangular tin, frequently found in *retiro*s in Bacá, when it had a lid, could be used to store *beijús.* Otherwise, in this *retiro*, it was cut open at the top and used for water.
- ***Vassoura de açai* -** this 'brush' or 'broom', made from the end of a branch of the açai palm (*Euterpe oleracea*) once the berries have been removed, made an effective broom. Some were used for sweeping clean the dirt floor of the *retiro*, while others were used to brush clean the 'chapa' or metal sheet of the *forno* during the making of *beijus* and after making *farinha*. In this *açai*-growing area, where everyone enjoys the fruit of this palm, these brushes and brooms were common in all households as well as in the *retiro*s.
- ***Rodo* -** is the implement with which the *farinha* is moved around on the *forno*. The one in this *retiro* was a pole around 2.5 metres in length, at the end of which was a wooden 'blade' at right angles to the pole.
- ***Bacia* -** a large aluminium basin, about 75cms. in diameter at the rim, is another common item of equipment in the *retiro*. Dona L. owned two of these. While I was there, one was used to contain starch which eventually was made into *farinha de tapioca* and the other was used to contain the liquid that was squeezed out of the washed manioc starch. This liquid could sometimes be made into a *tucupí* sauce.
- ***Tarubã* -** this is a knife-shaped, wooden spatula, about 50cms. in length. It was used to move *beijús* and *farinha* around on the *forno*. The one I saw was made from *andiroba* wood (*Carapa guianensis*).
- ***Beijú* knife -** is a long-bladed steel knife used for cutting *beijú* while it is toasting on the *forno*. The blade is about 45cms in length and about 6cms. wide at the thickest part.
- ***All kinds of blocks and planks of wood -** *planks and blocks of wood were required for* a variety of purposes: for example, to span the *masseira* support for a recipient or sieve. Small blocks, made from a*ndiroba* wood, were being used as a weight for securing the *pé-de-moleque* cake on the *forno*. This wood was used because it is light in weight. It was explained to me that a heavy block would not have worked, presumably because the contact with the metal of the *forno* would have caused the banana leaf to burn.

APPENDIX 4C

PROCESS OF EXTRACTING STARCH IN THE INHAMBUPE, ALAGOINHAS AND NEIGHBOURING AREAS:

METHODS OF FOUR PRODUCERS.

1. G. & M. - Crisópolis - Factory makes beijú, tapioca and puba.

Puba molhe (for carimã) - 3 types

- Peel
- Leave in soak for 5 days (Monday - Thursday)
- Wash with soft quality water
- Mix with water (in 2 aluminium basins)
- Press
- Sieve with a rectangular, traditional style sieve
- Sell it damp, just like this, in a plastic bag

Another kind of dried puba - fina

- Following from recipe for puba…
- line the *forno* with a nylon cloth - the oven should be neither cold nor hot
- Place a straw mat on the top
- Leave for 2 days without disturbing

  This can be used for making cakes ('torta'). It is used in Rio Real more than tapioca.

The same - sieved fine - puba fininha

- Sieve the above puba: pass it through an old mincer
- It makes a fine powder used for *beijú*

Beijú

- With salt, coconut, without coconut, with sugar: made from 19.30 onwards on Fridays and taken to market at 2am in Rio Real

Farinha de tapioca

N.B. Tapioca is not the same as puba…

- Sits for about 3 hours (probably in a plastic barrel); place a cloth on top and cover this with ashes to dry it off

- Sieve it with a fine metal rectangular sieve into basin and add salt (not sugar)
- Heat the *forno* until it is very hot; sieve the *farinha* over the *forno*, then break it up and sell in three different qualities: *grauda, granulada* and *miuda*

2. B. & A - Inhambupe market

To make tapioca

- Wash manioc
- Squeeze it in a sack and collect starch in huge rubber receptacles
- The next day, remove the water (*manipuera*) and squeeze it out through the cloth again into another rubber receptacle (it is very white)

(I think this is only a partial explanation)

3. M-L & J-C- Catuzinho

To make 'goma' for beijú

- Scrape the manioc
- Grate it
- Cover it with water in big blue barrels
- Stir it about by hand
- Leave it until the next day
- Remove the water and wash - leave
- Remove the water
- Place a dry cloth on the top to dry it
- Wring the cloth out and return to the barrel until the *goma* is dry
- Grate the *goma*
- Next day sieve (with square sieve) over a hot, round *forno* to make *beijú* either with or without coconut

To make puba

- Leave the manioc to ferment in water (with the peel on) for 4-6 days
- Remove the skin
- Wash
- Sieve with a fine nylon sieve
- Place the manioc in a cloth sack with water

- (In practice, Carlos left his starch to settle in tile-lined tanks. A man scooped it up with his hands into an old safety helmet and put it into a blue barrel into which water was running so that water then ran through the starch, washing it)
- Wash under the tap in the sack to remove the *goma* (starch)

4. D. - Ponto de Beijú 7:24-

Making starch for bolachina de goma, biscoitos (not beijú)

- After peeling and grating the manioc…
- Wash the manioc in tank using water from second tank
- Pass the mass to the 2nd man who washes it with water from the tap (NB both tanks have an exit pipe)
- The water with the tapioca - pass it into big blue tanks
- Leave it over night
- Next day, discard the water
- Day 2 - rinse the tapioca again with tap water (you must change the water every day so that it does not turn azedo (acid))
- After this washing, you must not touch it as you would mix the lodo part with the white starch and it would never again become white: the container cannot be shaken
- The parts of the mass that are not white - on the surface (lodo - mud - she calls it) you can use for fertilizer
- Or dry it and use it to feed the pigs
- Remove the water: remove the 'mud'
- Place a cloth on tip to dry the surface (Do not use ashes - except when in a hurry)

To dry the goma - three methods -

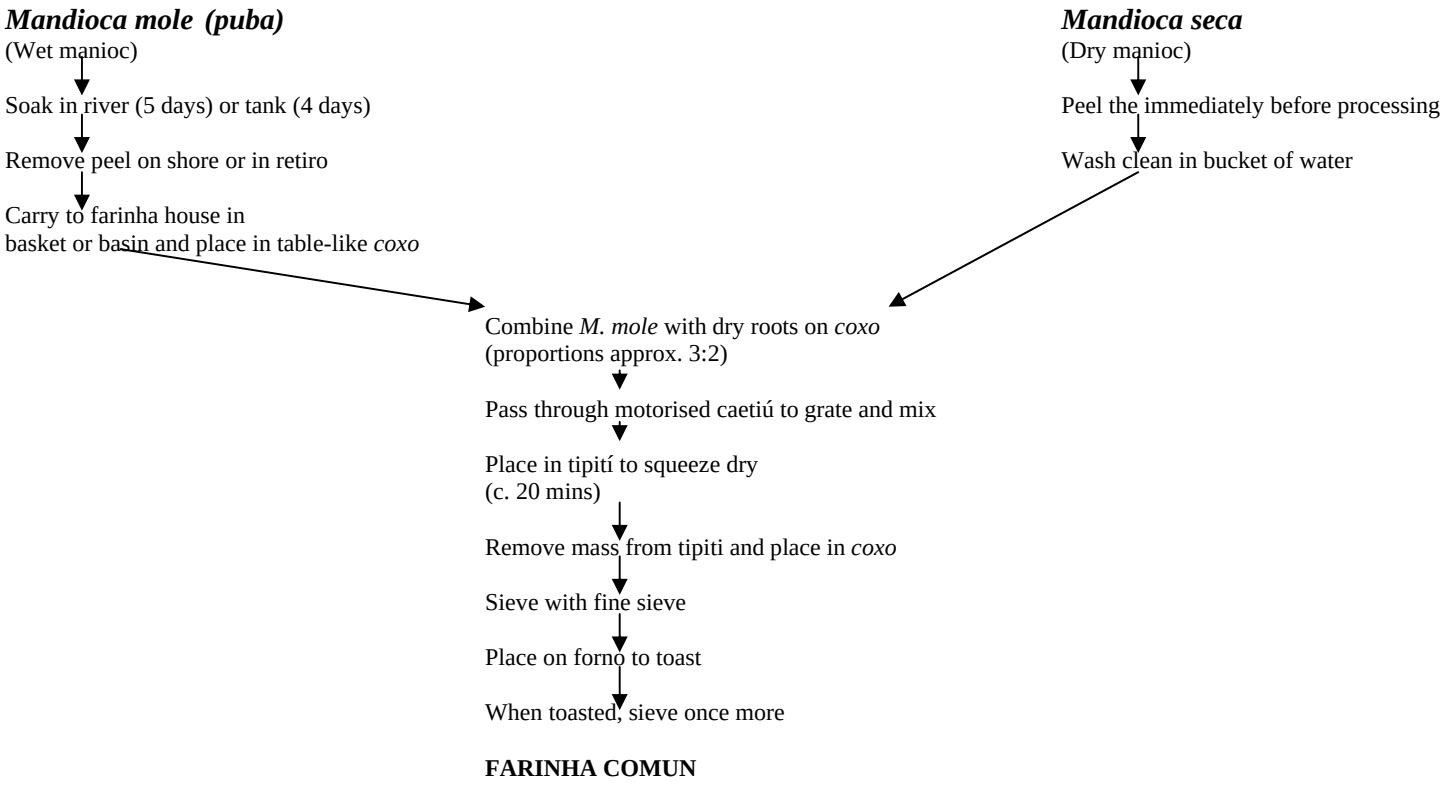
1. Make parcel out of goma and hang it up to dry for 2 days or more
2. Place on top of a cold *forno*
3. Place on wooden planks over the *forno*
   It is then ready to use.

Starch for beijú:

- Make as above but do not dry the *goma* - just remove half of the water - then you have ***goma verde*** which is OK for *beijú*
- Sieve it through a fine nylon mesh (for '***tapioca de beijú***)
- Sieve a second time through a round *'palha e trisuma'* sieve

•

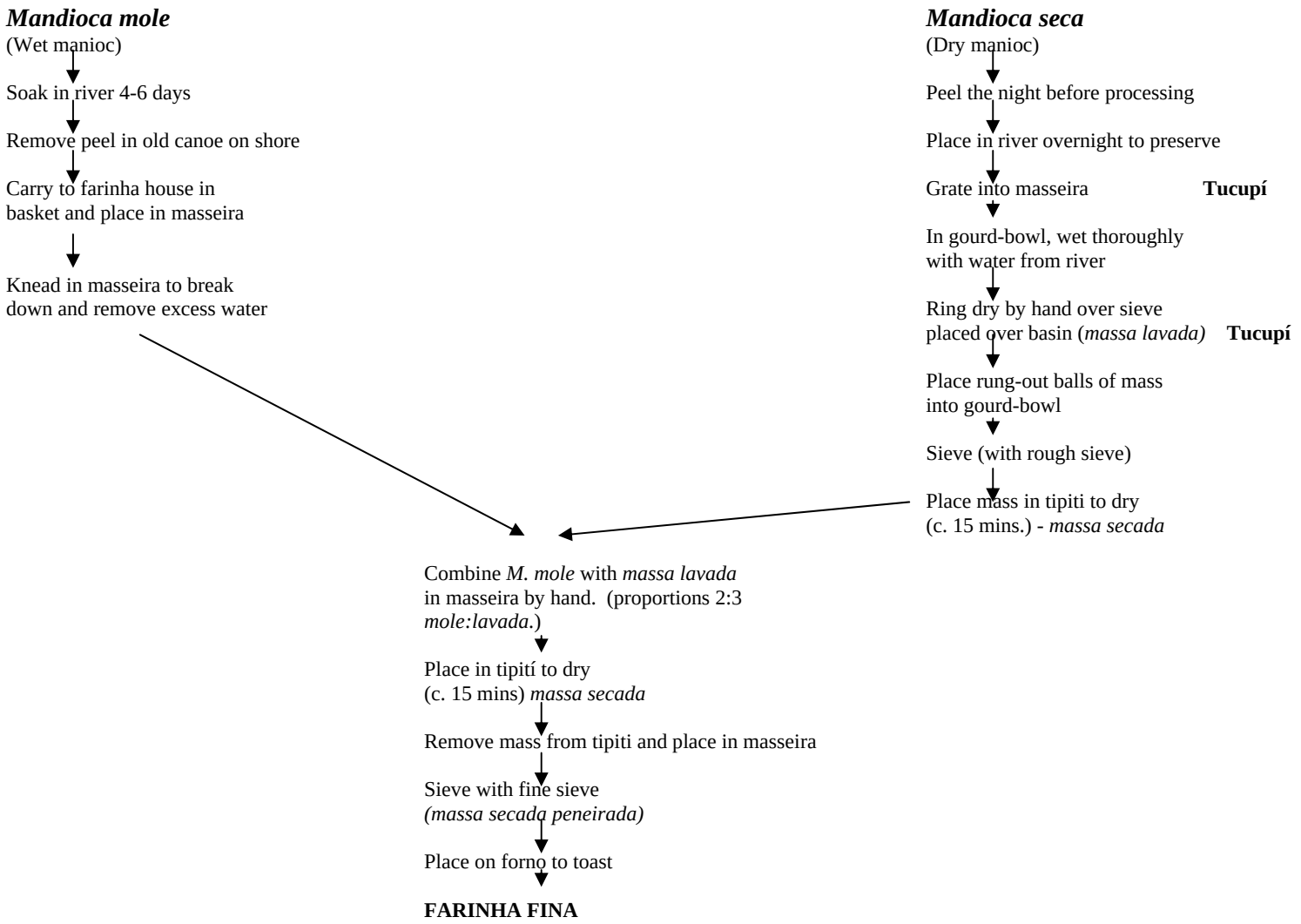
APPENDIX 4D PROCESSING MANIOC ROOTS IN ESTRELA, S.D.CAPIM



Notes:

1. Machinery powered by gas is used.
2. Only 'mandioca' or poisonous varieties are used in this process.
3. The '*goma'* or fine starch sediment from the liquid waste from the tipití is not collected.

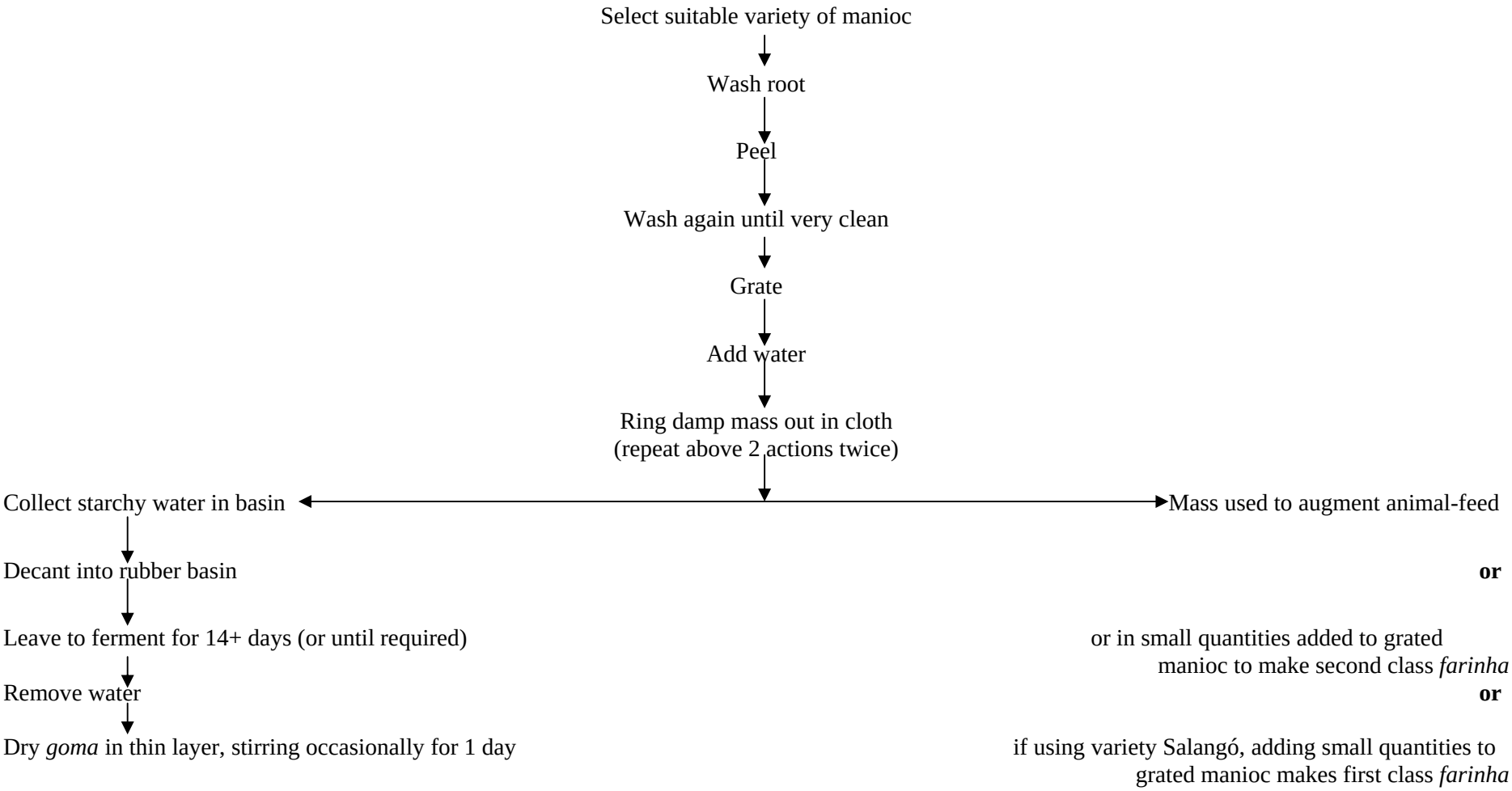
APPENDIX 4E *PROCESSING MANIOC ROOTS IN BACÁ*



Notes:

1. There is no electricity in this location and no motor-powered machinery is used.
2. Only 'mandioca' or poisonous varieties are used in this process.
3. For farinha grossa, the mass would be drained in the tipití for a shorter time.

APPENDIX 4F FERMENTED STARCH MAKING IN QUARAÇÚ



APPENDIX 4/1

THE RIO BRANCO COMMITMENT

We, over 100 representatives of farmers, fishermen, indigenous peoples, extractivists, artisans and NGOs from 32 countries, meeting in Rio Branco, Acre, Brazil, at the international workshop "Growing Diversity" from 9 to 19 May 2002, decided to make the following statement

- Considering that biodiversity is an invaluable heritage, which is being destroyed at an unprecedented rate.
- Reminding everyone that the current dominant models of the development driven by economic liberalization and corporate control, are the main cause behind the deterioration of biological diversity, reinforce social inequalities throughout the world, and undermine the sovereignty of nation states to take care of their people.
- Conscious and proud of the fundamental role of local communities and their traditional knowledge in the conservation and management of biological diversity in the past, the present and the future,
- Aware that the increasingly powerful multinational companies get richer and even more powerful by securing patents and other intellectual property rights over our biological resources to the detriment and at the expense of the inalienable rights of our local communities,
- Also aware that the majority of farmers in the world are women, and that they form the most vulnerable group which is adversely being affected by the destruction of biodiversity and their livelihoods.
- Considering that biodiversity in many of our communities is intrinsically linked to - and integral part of - our cultures, our religions, and our spirituality, and therefor cannot be treated as a simple commodity that can be bought, sold or wasted,

WE DECLARE

- That local communities and indigenous peoples are the custodians of biodiversity, and that they have the inalienable right and responsibility to continue to manage, save, exchange, and further develop the biodiversity under their custody, over and above any commercial or other interests.
- Similarly, we consider food sovereignty – the right of people to sufficient and healthy food at all times - as a central principle, which should not be subject to

other interests or considerations.

- We reject the current push towards a globalization that is driven predominately by commercial interests and undermines our cultures and our capacity to sustain and control our livelihoods.
- We reject the destructive and outdated development models that destroy biodiversity and the livelihoods of local communities, such as big dam projects, indiscriminate mining and oil projects, and destructive timber extraction.
- Political instability and war in many regions of the world, are major causes of destruction of biodiversity as they uproot people, kill communities and destroy local knowledge and customs. Interests foreign to these communities cause most of this instability and these wars.
- We reject the technological packages of Green Revolution and similar technologies that are being imposed on us, including hybrid seeds, chemical fertilizer and pesticides, and inappropriate forms of mechanization.
- We declare especially our frontal opposition to GMOs, since they are a threat to our agriculture, our animals, our health and our environment;
- We reject biopiracy and the patenting of our products and knowledge because they go against our biological diversity and cultural identity. We object especially to the patenting of life forms.
- We reject the privatization of water resources, because it is a public good, a collective property and the source of all life.
- We draw the attention the depletion and pollution of aquatic resources caused by industrial fishing and other commercial interests, which undermine the livelihoods of local fishing communities.
- We also note that the world's forests and all their inhabitants are living systems, are an inherent part of live on earth. Still, these forests are being cleared by commercial interests, thus destroying huge amounts of biodiversity and undermining our very possibilities of survival.
- We especially recognize the importance of sacred forests in the customs, beliefs and livelihoods of many local communities, and we consider that they form important sanctuaries for biodiversity.
- We denounce that land is increasingly taken away from small farmers and food production and ends up in the hands of big landowners and used for the production of export commodities. This is a major cause behind the destruction of agricultural biodiversity, and we demand the effective implementation of agrarian reforms that bring land back into the hands agrarian of small farmers for the production of food.
- We especially recognize the rights of indigenous peoples to their territories and demand the immediate implementation of the Convention 169 of the ILO on the rights of indigenous peoples.

WE PROPOSE

- That biodiversity based and integrated production systems under control of local communities be adopted and promoted as the principal mode of agricultural production.
- These systems should guarantee, as much as possible, the control of the local communities over de production, processing and marketing of agricultural and extractivist products.
- Our governments have the central responsibility to develop and implement policies, legislation and research to achieve this goal. For this to happen, current policies have to be redirected towards a holistic approach to

development, the promotion of local control over resources and the active participation of local communities in decision making.

- Scientific research should be based on the problems faced by farmers and local communities and should consider and respect local knowledge. Scientists should be accountable for the consequences generated by the practical applications of science.
- Concern over food security and the environment should take precedence over international trade interests. The World Trade Organization is not the place to decide on these issues. Neither should regional or bilateral trade agreements affect local biodiversity management.
- We demand from our governments to ensure a GMO free environment in our countries and in our farming systems and to support our efforts to raise awareness amongst farmers and consumers about the real and potential impact of GMOs to the environment and to human health.
- We also request a total ban on the patenting of live forms and the use of any IPRs on biodiversity and traditional knowledge. We want to see the strengthening of Farmers and Community Rights in the relevant international agreements and at the national level to ensure that farmers and local communities can continue to save, exchange and further develop biodiversity.
- We demand that our education systems be reoriented and sufficiently funded to teach our children understanding of, and respect for, indigenous knowledge and locally based biodiversity management.
- The current agricultural research institutions – national and international – should be radically restructured and reoriented to promote and support biodiversity based agriculture rather then undermining it. We see locally based and farmer led research – in partnership with scientists where needed – as the best way to carry out such research.
- Similarly, current destructive practices and policies in the fields of fisheries and forestry management should be stopped and reoriented to the sustainable management of the earth's forests and fish populations.
- Sacred sites should be respected and protected by international agreements, national legislation and taken into account in national and regional development policies.
- To address, with actions and policies, the problems faced by women, in different parts of the world, concerning gender discrimination. The gender issue should be included in all the educational and development programs and should be discussed with both men and women.

WE COMMIT OURSELVES TO

- Perform crop diversification and actively promote diversified integrated farming systems based on biodiversity in our communities and organizations. The use of local and traditional varieties should be promoted.
- To put up political pressure to promote public policies that that the interest of small farmers into account, and put the promotion of biodiversity central.
- To strengthen our efforts and campaigns to stop the patenting of life forms and to fight for an environment free of GMOs.
- To protect and enrich our local knowledge and organize local seed exchanges.
- Strengthen the role of women in agricultural biodiversity conservation and empower their organization in all levels.
- Organize peoples' movements. With little or no support from governments, grassroots initiatives to protect biodiversity are necessary.
- Establish an effective exchange and flow of information amongst us to

coordinate future actions and campaigns against the threats to biodiversity.
- Compel governments and aid agencies to reorient their aid programs so as not to interfere with local initiatives of conservation and resource management.
- Think globally while acting locally.

Enriched and energized by our individual and collective struggles for the local management of agricultural biodiversity, we commit ourselves to this pledge of conservation and sustainable use of agricultural biodiversity. In this we promise to each other to be generous as the earth, clear as the water, strong as the wind, and as far and as close as the sun.

And before we return to our countries as a token of our pledge, today in the spirit of friendship we exchange life – we exchange our seeds of knowledge and wisdom past on from generations to generations.

Agreed in Rio Branco, May 19, 2002

APPENDIX 5

NOTE FROM VISIT TO STARCH FACTORY NR. PARANAVAÍ, PARANÁ - JANUARY 2002 - extract from a report following a visit.

Treatment of effluent:

One of the main problems for factories, large and small, that process manioc, is that the effluent is highly toxic. I was impressed with the way it is treated. I later learnt in the ABAM[1] dossier that the Paraná authorities require that there be 'lakes' in which the effluent is treated. I did take notes about the process of treatment - and was thinking about the area near to V. da Conquista (Campinhos) where effluent is such an environmental problem. Note that the costs of this type of treatment for a factory is given as US$30,000 (ABAM 2001:23) Could this be a possible solution for Campinhos?

There are 4 lakes of effluent each one a little lower than the other. Between the first and second lakes is a small pump-like contraption which treats the poisonous water with a substance called 'EM'. EM is short for “Effective Micro-organisms”, an organic product developed in Japan by Dr. Teruo Higa, , professor of agriculture (www.auroville.com/auroannam/em.htm. See also website www.emtrading.com re. The effective management of waste water). Initially, according to my informant, the proprietor of the factory, EM was not originally made for the treatment of effluent but rather to optimise the activity of micro-organisms in the soil. He mentioned the involvement of a Japanese research scientist in this technology by the name of Teruhisa.

They occasionally spray the second lake - which looks quite black, like lava. The treated effluent is pumped into different points in the second lake, otherwise the treatment would not circulate. The degree of toxicity of the raw effluent in lake 2 was considerably reduced by the time the water reached it after treatment with EM.

The third lake is planted with the water plant, commonly thought of as a pest, Agua Pé in portuguese, *Eichhornia azurea (SW)* Kunth otherwise known as *Pontederia azurea (SW)* and *Pontederia aquatica* Vell. A local research scientist considered these names to be synonymous. But you cannot let the plant die in the water as it would clog up the lake - and a strip of water is always kept clear to assist with this. Surprisingly there were fish in this lake. The plant thrives on this poison/dirt.

[1] ABAM*: Associação Brasileira de Produtores de Amido de Mandioca*. Brazilian Association of Manioc Starch Producers.

Lake four looked fairly clean and normal and from here the water was drained off into a river. Apparently cleaner than the minimum standards set by the environmental agency.

APPENDIX 6

DESCRIPTION OF SAMPLES OF FARINHA AND RELATED PRODUCTS IN 4 FIELD SITES

1 CAPIM

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
1.		Carimã		probably from Capim	100g. bag.
2.	3.7.02	Farinha. de Água	Tapuia	Seu Raimundo	Very rough, uneven granules. Bits of fibre. Dark/ yellow in colour). 5 days soaking.
3.	8.7.02	Tipo 2 . 'menos escaldada' (less toasted)	Uruã, jabotí, cearense	Seu José Zacarias. Breves, Catita, Capim	Creamish-yellow. Crunchy, slightly rough. Fine traces of fibre.
4.	8.7.02	Tipo 1. 'mais escaldada' (more toasted)	Uruã, jabotí, cearense	Seu José Zacarias. Breves, Catita, Capim	Darkish cream-yellow. Slightly rough, uneven graules. Fine traces of fibre.
5.	.6.02	Farinha de 3 dias		Fé em Deus, Capim	Dark cream, yellowish. Very rough, large granules.
6.	.7.02	Farinha mixturada		Dona Bené & Seu Raimundo.	Sample taken from the home of Dona América. Creamish-yellow. Crunchy, fairly even grains. Tiny particles of fibre.
7.	.7.02	Farinha de 3 dias	Tapuia	Teotônio de Oliveira, São Joaquim, Capim	Palish cream (compared with other Capim farinhas). Predominence of finish granules mixed with some larger ones. This farinha was more expensive and considered the best. (check against field notes)
8.	.7.02	Macaxeira seca	Macaxeira	Dona América	Fairly fine starch-like powder. (used for making Caribé).
9.	7.02	Farinha de Água		Terra Nova (invasão), Belarzinha.	Sample taken from Dona Creuza's home, Capim town. Dark yellow in colour. Fairly large granules, with very few traces of fibre.

2 BACA, GURUPÁ

(Samples that are numbered - find ref. in notebooks)

Granules are not evenly rounded as in the case of the Capim farinhas.

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
1	6.02 (1)	Farinha			Darkish yellow. Crunchy and slightly rough. Mainly finish granules with some larger ones. Slight traces of fibre. Gives appearance of mixed substances - mixed with fine white starch.
	6.02	Farinha	Jaçana and Barcarena	Dona Marialici & Seu Carlos Dias Gomes. Brasilia, Bacá.	Large, fairly uneven granules (larger than (1). Clear, strong yellow in colour. Finest particles of fibre. This was the farinha that Seu Carlos sold in Gurupá town for a very good price.
3	6.02	Pô de farinha		Dona Marialici & Seu Carlos Dias Gomes. Brasilia, Bacá.	Deep yellow, fine almost powder in quality. Fine particles of fibre. She uses it for mingau and to fry fish in (like breadcrumbs) (Even 2 yrs. later it has a good flavour! - hard, crisp fine granules)
4	6.02	Farinha		Seu Benjamim, Bacá.	Darkish cream-yellow. Mixture of finish and rougher granules with particles of fibre. Made in his own roça and consumed at home. Probably not sold.
5	6.02	Farinha de Tapioca		Seu Benjamim, Bacá	Whitish, uneven globules (ie. varying sizes)
6	6.02 (2)	Farinha de Tapioca			Off-white, creamish globules. Fairly uneven sizes.
7	4.6.02	Farinha	Carrazedo, Barcarena & Jaçaná. (nb. the smallest roots are soaked in water to remove skin)	Dona Darci Morais de Carvalho, Brasilia, Bacá.	Fairly fine, darkish cream coloured. Slightly uneven grain. Scattering of fine fibres.

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
8	6.02	Beijú Mimoso		Brasilia, Bacá.	See notes for ways of making this. Whitish, crisp, fine-grained, thin biscuit-like product. The fine layers are folded double. My sample is broken up into small, rough bite-sized pieces.
9	28.5.02	Beijú Ligeiro		Bacá. (Prob. the ones I helped to make - Mundico's wife)	Small biscuits approx. 2x2 cms. Toasted, dark cream in colour. Fairly hard. (Still Ok to eat 2 yrs. later!)
10	28.5.02 (or June)	Beijú Chica (check name)		Bacá. (Either D. Luisa or Mundico's wife)	6-7cms diameter roundish biscuits. Slightly dented in the middle. About 1cm thick a thickest point. White - with tiny traces of toasted surface on some.

3 QUARAÇÚ, CÂNDIDO SALES (Ba)

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
1	1.10.02	Farinha granulada		Seu Adenilson, Fazenda Paraíso, Quaraçú.	Fine, slightly off-white powder. Some enlarged grains and some trace of fibre
2	28.10.02	Farinha	Sergipe, Platinhão & Sutinga. Only sieved once after toasting.	Casa de Roda do Estado, Lagoa Preta, Cândido Sales. Seu Zé.	Very fine, white powder. A few rougher 'lumps'. Traces of fine fibre.
3	25.9.02	Farinha comun		Seu Antônio, Lagoa Grande, C. Sales.	Fine to very fine white powder. Traces of fine fibre. (Note that this feels different to 2 - it flows less well through the fingers). Also the poly bag is opaque with starch dust.
4	8.10.02	Farinha granulada		Estiva, C. Sales. Owner: Seu Ildo ('Tela')	Finish, slightly off-white. Much dryer, more flowing feel than (3). A little fine fibre.
5	4.10.02	Farinha		Casa de Roda da familia Vivaldo & Irani. Mumbuca, C. Sales.	Off-white, medium-fine with a few granules of starch. Slightly uneven granules. Some fine and non-so-fine fibre. Feels like (3). Very poor family.
6	27.9.02	Farinha gemada (little egg-yolk)		Seu Florindo, Possidônio, C, Sales.	Described to me as "Melhor que a farinha comun mais granulada'. Off-white. Fairly uneven granules yet fine. Some fine and less fine pieces of fibre. Poly bag clouded with starch dust. Fibre as in (3)
7	3.10.02	Farinha		Seu. Zé de Andrade, Mumbuca, C. Sales.	This farinha was made in a forno stired by horse-power, (see photos) - the only casa de rodo of this type that I saw. Very poor people. Slightly off-white. Uneven granules. A few impurities. Some fine and less fine fibre.

4 SOME BISCOITOS FROM CAMPINHOS & SIMÃO, V. DA CONQUISTA

Note these are only a tiny sample of the dozens and dozens of different types of biscoito that are made. All these samples were from a single small 'factory' or bakery in Simão/Campinhos (check notes for name) Collected with Josa Jan 02.

	DATE	NAME	PLACE OF ORIGIN	DESCRIPTION & NOTES
1		Siquilho de Trigo e Goma	Conquista	3x2.5cms. Tiny biscuits cut with serrated edge. Slightly toasted. Mixture of wheat flour & goma.
2		Bolão de erva doce.	Conquista	Puffy balls (hollowish) about 5cms diameter and 2 cms deep. Ingredients: goma, erva doce, butter and eggs.
3		Palitão de erva doce	Conquista	12-13 cms x 3 deep. Long, roundish snack bread. made from goma.
4		Biscoito avoador de queijo	Conquista	Biscoito de goma fermentada. Tiny balls about 1.5cms in diameter. Very light. Cheesy snack.
5		Biscoito de goma cozido e assado	Conquista	Rings about 3.5dms diameter with hole in middle. Fairly 'heavy' (compared to avoador)
6		Paletinho	Conquista	Goma e queijo ralado. (goma and grated cheese) Small, fat fibres (4-7cms long) about 1.2-1.5 cms diameter. Very light
7		Biscoito caseiro	Conquista	Goma e farinha de milho. (goma and maize flour) Small, light balls c. 3cms. diameter.

5 INHAMBUPE AND AREA

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
1.	23.11.02	Puba Seca		Bought in Alagoinhas market. From Dona Rita, Catuzinho.	Even sized yet not regularly round granules. White-grey in colour. Almost no trace of fibre.
2.	15.11.02	Farinha (de primeira qualidade)	Alagoão, Cemiterio, Pratinha.	Casa de Farinha, Seu Luiz & DONA Teresinha, Mandacarú, Inhambupe Made by Seu Elias, D. Mariete and Francisco..	This farinha is sold in Alagoinhas market. Palest almost lemon-white. Finish, slightly uneven granules with traces of fibre. Very slightly starchy to the touch.
3.	18.11.02	Farinha Fina		D. Maria dos Santos Ramos & Antonio de Oliveira Ramos, Formoso, Inhambupe.	'Forno mais frio, ela sai mais alva'. (the cooler the forno, the whiter the farinha) White. Fine, slightly rough granules with some traces of fibre. Slightly powdery to the touch.
4.	18.11.02	Farinha grossa		D. Maria dos Santos Ramos & Antonio de Oliveira Ramos, Formoso, Inhambupe.	'Forno quente e mais devagar' (hot forno, slower toasting) Pale yellowy-white. Crisp to the touch. Uneven small granules - not very fine. Quite a lot of traces of fibre. D. Maria's mother likes this farinha.
5.	18.11.02	Farinha Comun		From the home of Dona Elena, Formoso, Inhambupe. Made by Seu José in his casa de farinha.	Stored in large cylindrical tank by D. Elena. Seu José makes this farinha with an earthenware forno (forno de barro). 'Botou muito fogo' (very hot fire) Oatmeal in colour. Quite crisp in texture, mainly fine with some rough granules and a few fine traces of fibre.
6.	18.11.02	Farinha		Made by Dona Elena, Formoso, Inhambupe.	She has a rodete and forno e barro at home. (very old-type of grater manually powered with a wooden wheel and earthenware forno) Palish lemony-white. Finish but very uneven granules - some quite large granules. Some impurities and a fair amount of fine traces of fibre. Fairly crisp - flows well.

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
7.	18.11.02	Puba Seca		Dona Agripina, Formoso, Inhambupe.	Unlike (1). Finish, uneven granules. Just off-white. Some powdery particles. Some impurities and a few traces of fibre. A little starchy to the feel.
8.	21.11.02	Farinha amarela	Jalé & Ciminterio	Seu Manoel Pinheiro dos Reis, Entrocamento Pinto, Crisópolis.	Strong yellow (artificial colouring has died the paper note in the bag and died my field note-book too - but not the poly bag). Fine, slightly uneven sized granules. Traces of fibre. At close examination, it looks as though some granules take on the dye more than others. Dry to the touch.
9.	18.11.02	Farinha Especial	Platinha & Cravelina	Dona Agripina, Formoso, Inhambupe.	Very white and very fine (like wheat flour). Almost no discernible traces of fibre. Powdery and a little 'sticky' to the touch (a bit like Q3). Leaves the poly bag opaque.
10.	28.11.02	Farinha de Tapioca		Seu João Carlos, Catuzinho, Inhambupe.	This is made from starch, spread out on the forno like a beijú and then crumbled up into very small fragments. It is very white and, when fresh, very crisp.
11.	18.11.02	Farinha Comun	Ceminterio & Cravelão	Dona Agripina, Formoso, Inhambupe.	Very white, rough, uneven grain with some largish 'lumps' and very fine, long traces of fibre. Quite crisp and dry.
12.	18.11.02	Farinha Comun	Ciminterio, Platinha and Cravelinha	Dona Maria da Paz, Formoso, Inhambupe.	Very slightly off-white. Mainly fine with a few rougher grains. Some longish traces of fibre both fine and thickish. Slightly powdery to the touch - fairly dry.
13.	18.11.02	Tapioca (goma)		Dona Agripina, Formoso, Inhambupe.	Very white, very fine powdered starch with some rougher 'lumps' which is hardish and does not disintegrate into powder when touched. Very dry (and lubricating).
14.	26.11.02	Farinha lavada		Dona Lindinalva, Catuzinho.	(This is the one with the starch washed out) This is used for pig and dog feed. Off white, dry, fine, fairly even grains. No starch to the feel. Fine, small traces of fibre only.

	DATE	NAME	VAR. OF MANIOC	PLACE OF ORIGIN	DESCRIPTION & NOTES
15.	28.11.02	Farinha de Primeira		Seu João Carlos, Catuzinho, Aramari (Bahia)	White. Even-grained, fine. (Like granulated sugar but a little less white. Small traces of fibre. Dry to the touch - not too powdery/starchy.

APPENDIX 7

List of foods present in a house in Bacá, Gurupá May 2002
(Referred to in Ch. 8., Pt.2)

Product	Manufacturer & Trade name	Place of manufacture (or HQ of manufacturer)
Alcohol vinegar	Mestre Cuca	Fortaleza, Ceará
Beans *(feijão)*	Distr. Freitas Lópes	Belém
Biscoito Hiléia (biscuits) (Leite)	Hiléia	Belém
(Beef) *Carne de boi branco*	(fresh)	Porto de Moz, PA
(Buffalo meat) *Carne de búfalo*	(fresh)	Almerim, Prainha, PA
(Pork) *Carne de pourco*	(fresh)	Porto de Moz, PA
Chicken (frozen)	Sadia	
Chicken (frozen)	Brotão	Sta. Catarina
Chicken (frozen)	Nutrisa, Grupo Tomazini.	Manaus AM. Pires do Rio, Goias.
Coffee	Maratá	Largato, Sergipe
Cream crackers	D.F. Bastos. Vitória.	Ananindeua, PA
Margarine	Vida Alimentos Ltda.. Mariella	Ipiranga, São Paulo.
Margarine (soya)	Bunge Alimentos. Primor.	Paraíba
Mayonnaise	Unilever, Best Foods. Hellmans	Pouso Alegre – Minas Gerais
Powdered milk	Nestlé. Ninho	Ibiá – Mato Grosso
Rice	Josapar, Joaquim Oliveira SA. Tio João	Pelotes, Rio Grande do Sul
Soya Cooking Oil	Sadia	Campo Grande, Mato Grosso do Sul. Rondonópolis Mato Grosso, (info. from São Paulo)
Spaghetti *(macarrão)*	J. Macedo Alimentos N.E. Brandini	Maceió Alagoas and Salvador BA

All *açaí* and *farinha* were produced at home.

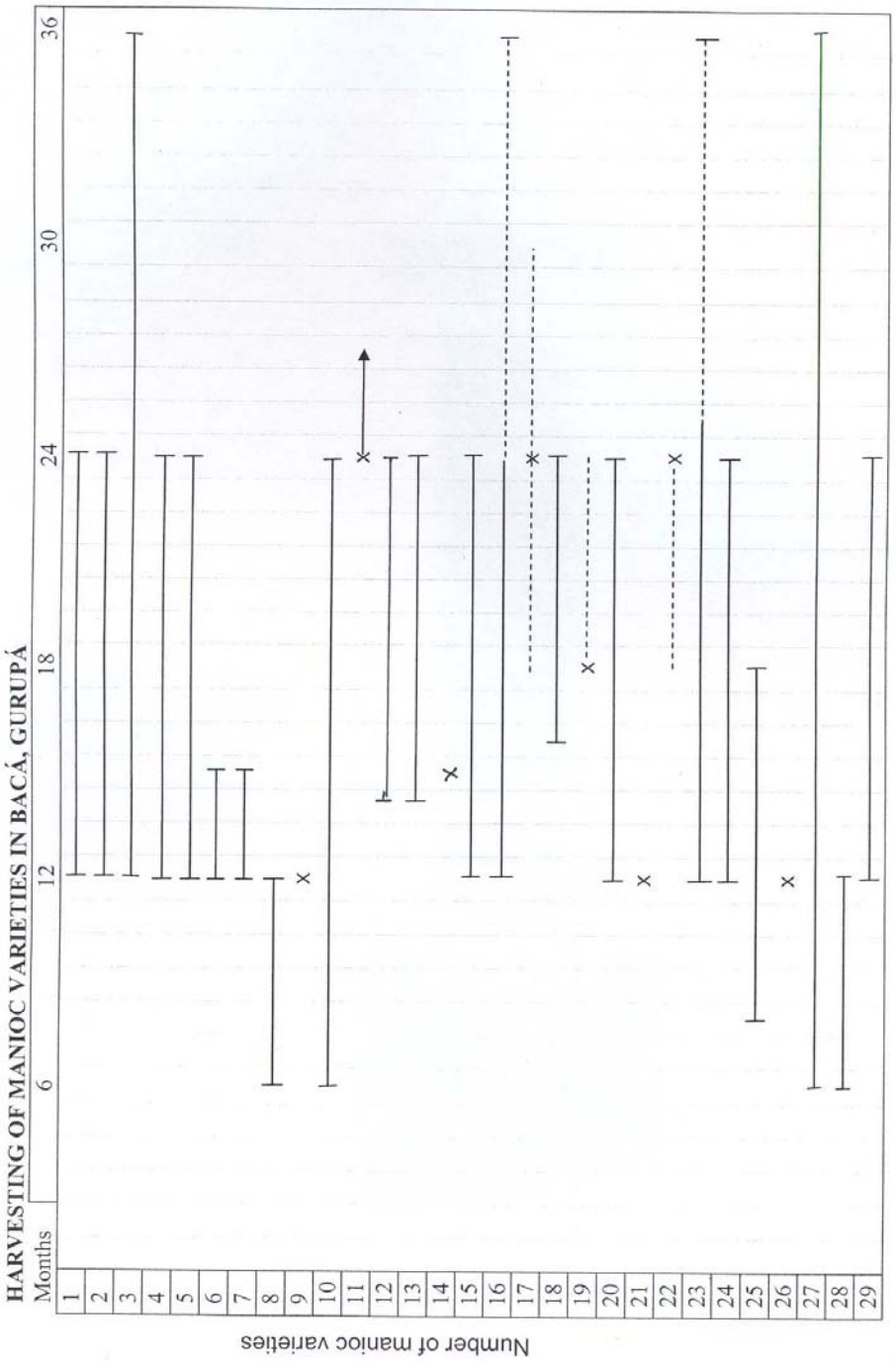
APPENDIX 8A

Key for Appendices 8A-8D

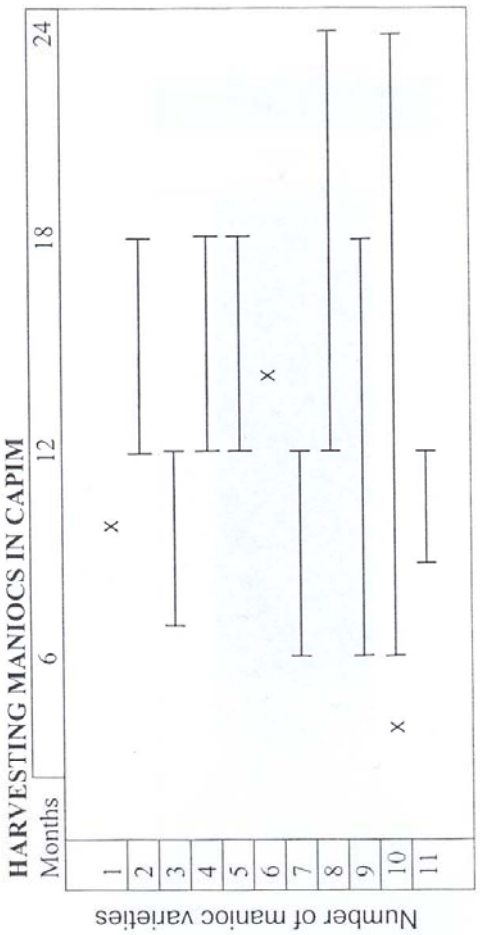
_____ Period during which harvesting can take place.

---------- Possible, but not ideal period during which harvesting can take place.

X Harvesting must take place at this time.

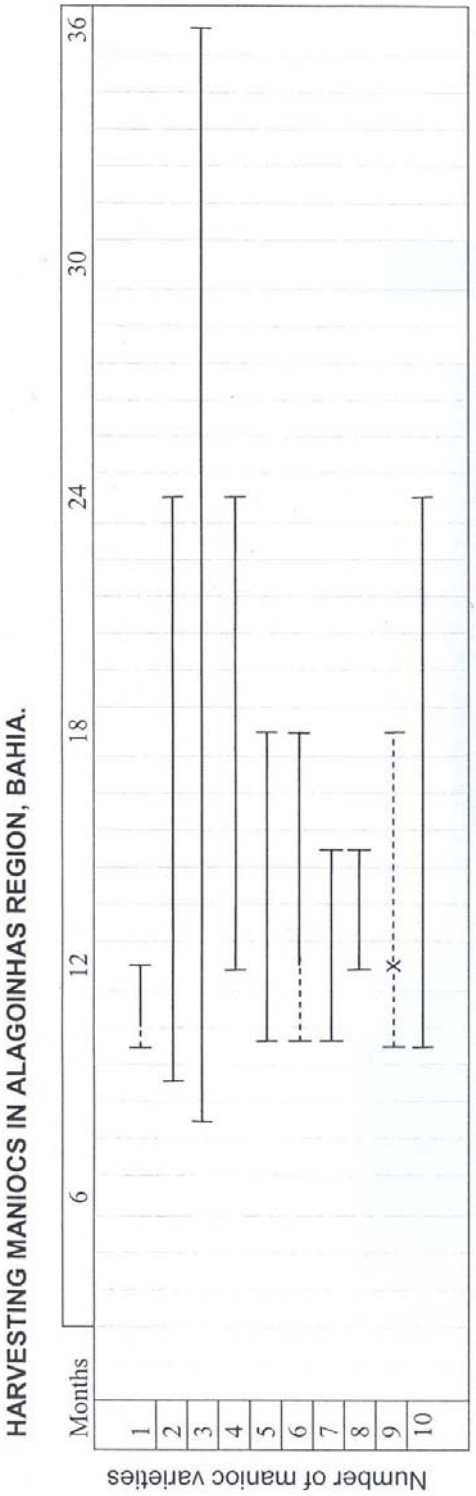


APPENDIX 8B


HARVESTING MANIOCS IN CAPIM
Months
6
12
18
24
1
2
3
4
5
6
7
8
9
10
11
Number of manioc varieties

APPENDIX 8C

HARVESTING MANIOCS IN ALAGOINHAS REGION, BAHIA.



APPENDIX 8D

* Probably up to 5 years
† 4-8 years. (NB not before. Exceptional variety.)

34

APPENDIX 9A

THE NAMING OF MANIOC IN BACÁ, GURUPÁ, PARÁ

Total number of varieties found in Gurupá: 61 ***(50 mandiocas, 11 macaxeiras)***

* = Macaxeira

(A) PEOPLE AND PLACES

Variety name	English	Total
Barcarena	Town	
Bette	Woman's name	
Campina	Place	
Carrazedo	Town	
Chico Marques	Man's name	
Dona Tomasa	Mrs Tomasa	
Farías	Surname?	
Graciana	Woman's name	
Guillerme	Man's name	
Iracuru	Place?	
Jaraçi	Place?	
Jaraçu	Place?	
Joaquina	Woman's name	
Josina	Woman's name	
Maranhense	from Maranhão State	
Mosara	Woman's name	
Mulatinha	Little Mulata Girl	
Pai Lourenço	Father Lourenço	
Rapazinho do Sertão	Little boy from the drylands	
Santarem*	City	
São José	St. Joseph	
São Tome baixinho	Little St. Thomas	
São Tomé grande	Big St. Thomas	23

(22 mandiocas, 1 macaxeira)

(B) FISH, BIRDS AND ANIMALS

Variety Name	English	Total
Peixe Boi	Large fish	
Pirara	Fish	
Sardinha	Sardine	
Tartaruga	Tortoise	
Arari	Bird (or plant?)	
Jaçaná	Bird	
Jaçaná baixinho	Little bird	
Trairá	Fish	
Apapá i	Type of sardine	
Maniva jiboia*	Boa constrictor stick	10

(9 mandiocas, 1 macaxeira)

(C) FRUIT AND PLANTS

Variety Name	English	Latin Name	Total
Abacate	Avocado	*Persea americana*	
Bacuri	Bacuri fruit	*Platonia insignis*	
Mamão	Papaya	*Carica papaya*	
Tucumã	Palm	*Astrocaryum tucuma*	4

(4 mandiocas, 0 macaxeiras)

(D) DESCRIPTIVE

Variety Name	English	Total
6 meses branca	White 6 months	
6 meses roxo	Rust 6 months	
Amarela*	Yellow	
Amarelinha	Little Yellow	
Branca*	White	
da Acha Branca*	White Stem	
Folha Estreita	Narrow Leaf	
Mandioca amarela	Yellow Manioc	
Manteiga*	Butter	
Pintadinha*	Painted	
Pretinha*	Little black	
Roxinha	Rusty	**12**

(6 mandiocas, 6 macaxeiras)

(E) OTHER NAMES

Variety Name	English	Total
Achada	Found one	
Achada amarela	Yellow 'found one'	
Achada pretinha	Black 'found one'	
APROSEM (no name)	Name of association where variety was found	
Baia*	?	
da FASE*	Name of association where variety under observation	
Desconhecido (x2)	2 unknown varieties	
Mandioca do beijú	Manioc for beijú making	
Manguba*	?	
Maniteba	?	
Sol	Sun	12

(9 mandiocas, 3 macaxeiras)

APPENDIX 9B

THE NAMING OF MANIOC IN SÃO DOMINGOS DO CAPIM, PARÁ

Total number of varieties found in S.D. Capim: 48 (43 *mandiocas*, 5 *macaxeiras)*

* = Macaxeira

(A) PEOPLE AND PLACES

Variety name	English	Total
Bragança	City	
Cearense amarela	Yellow from Ceará State	
Cearense branca	White from Ceará State	
Dona Antônia	Woman's name	
Maranhense	Maranhão State	
Pacajá amarela	Indian people/river yellow	
Pacajá branca	Indian people/river white	
Raimundo Domingo	Man's name	
São Bento	St. Bento	
Tapuia	Tupí name for non-Tupí indian people (derogative)	
Zulinda	Woman's name	11

(11 mandiocas, 0 macaxeiras)

(B) FISH, BIRDS AND ANIMALS

Variety Name	English	Total
Camarão	Prawn	
Gurijuba	Yellow fish	
Jabuti	Reptile	
Jiboia	Boa constrictor	
Tainha	Fish	5

(5 mandiocas, 0 macaxeiras)

(C) FRUIT AND PLANTS

Variety Name	English	Latin Name	Total
Angelim	Tree	*Andira cuyabensis*	
Miriti	Type of palm	*Mauritia vinifera*	
Pequi	Tree	*Caryocar brasiliense*	
Tachica	'Little tree'	Fam. Caesalpiniaceae	
Tachizinho	'Nice little tree'	'	
Táxi do Paulo	'Paulo's tree'	'	
Táxi grande	'Big tree'	'	
Táxi vovó	'Granny's tree'	'	
Tucumã	Type of palm	*Astrocaryum tucuma*	
Uruã	Tree (?or Aruã – ind. people from Marajó)	*Cordia alliodora*	10

Note: Táxi is a generic term for a variety of tree associated with a type of ant in the Tupí language
(10 mandiocas, 0 macaxeiras)

(D) DESCRIPTIVE

Variety Name	English	Total
15 kilos	15 kilos	
6 meses	6 months	
Amarelona	Big yellow	
Batatinha	Little root	
Branquinha	Little white	
Macaxeira amarela*	Yellow, 'sweet' manioc	
Macaxeira branca*	White 'sweet' manioc	
Macaxeira roxinha*	Rust 'sweet' manioc	
Mijuba amarela*	Tupí word for yellow manioc	
Mijuba branca	White Mijuba	
Olho verde	Green young leaf	
Pretinha amarela	Yellow blackie	
Pretinha branca	White blackie	13

(9 mandiocas, 4 macaxeiras)

(E) OTHER NAMES

Variety Name	English	Total
Pinga de ouro	Dram of gold	
Deus me Deu	God given	
Torrão	Patch of (hard) earth	
Boa Viagem	Good journey	
Carge de jumenta	Mule's burden	
Hambrugesa	Hamburger	
Inha	(suffix, diminutive for small)	
Jurará branca	? white	
Jurará amarela	? yellow	
Manteiga	Butter	
Chapéu do sol*	Sun hat	9

(8 mandiocas, 1 macaxeira)

APPENDIX 9C

THE NAMING OF MANIOC IN QUARAÇÚ, BAHIA

Total number of varieties found in Quaraçú: 46 (22 mandiocas, 24 mandiocas mansas)

= Mandioca mansa/aipim

(A) PEOPLE AND PLACES

Variety name	English	Total
Bromadeira*	After the town, Brumado (Ba)	
Cramoquem*	Indigenous people (extinct)	
Julieta	Woman's name	
Julliana	Woman's name	
Pará	State	
Paraguay (or Paraguá)*	Country	
Sergipe (or Sergipana)	Name of state	7

(4 mandiocas, 3 M. mansas)

(B) FISH, BIRDS AND ANIMALS

Variety Name	ENGLISH	Total
Bico de Urubu	Vulture's beak	
Orelha de Onça	Jaguar's ear	
Periquitinha	Little parakeet	
Periquita	Parakeet	
Lazã*	Female of cinnamon/yellow-red horse	
Pingachão*	Good looking horse	6

(4 mandiocas, 2 M. mansas)

(C) FRUIT AND PLANTS

Variety Name	English	Latin Name	Total
Pacaré*	(? Pacari is a tree)	(*Lafoensia densiflora)*	
Aipim Cacau*	Cocoa 'sweet' manioc	**Theobroma cacao**	
Cacau preta*	Cocoa black	*Theobroma cacao*	3

(0 mandiocas, 3 M. mansas)

(D) DESCRIPTIVE

Variety Name	English	Total
Aipim branca*	White ‘sweet’ manioc	
Aipim preta*	Black ‘sweet’ manioc	
Aipim rosa*	Pink ‘sweet’ manioc	
Branquinha	Little white	
Gaiuda (or Galhuda?)*	Bushy, many branches	
Lisona*	Big smooth one	
Malacacheta*	Malachite (ie. shiny)	
Mulatinha	Little Mulata girl	
Platinhão (or Platinha)*	Big silver one	
Pretinha	Little black	
Roxinha	Little rust	
Sempre verde (or unknown)	Evergreen (or unknown)	12

(5 mandiocas, 7 M. mansas)

(E) OTHER NAMES

Variety Name	English	Total
Calombo*	?A callous	
Desconhecida*	Unknown	
Gegi (or Geg Preta)	?Might be from *jeque* – donkey – black	
Lã de mole	? lã - wool/soft down on plant. Mole – luckless person	
Manteguinha*	Little butter one	
Manteiga*	Butter	
Milagrosa brava	Miracle ‘bitter’ one	
Milagrosa mansa*	Miracle ‘sweet’ one	
Pão de China*	Bread of China	
Pão*	Bread	
Salangó	Prob. old name	
Soubara	?Prob. old name	
Sutinga de cepo*	Old name (block of wood)	
Sutinga de talo	Old name (stem)	
Taboquera*	Person of means	
Vassoura	Broom	
Vassourão	Big broom	
Vassourinha	Little broom	18

9 mandiocas, 9 M. mansas)

APPENDIX 9D

THE NAMING OFMANIOC IN THE ALAGOINHAS AREA, BAHIA

Total number of varieties found in the Alagoinhas area: 59 (44 mandiocas, 15 aipims)

* = Mandioca mansa/aipim

(A) PEOPLE AND PLACES

Variety name	English	Total
Aipim São José*	St. Joseph 'sweet' manioc	
Bom Jardim (1)	Probably a place	
Caatingueira	Of the *caatinga* (savanna)	
Cariri	Indigenous people from Ceará. Extinct.	
Catarina	Woman's name	
Cidade da Praia	Town on the beach	
Lagoão	Big lake	
Maciel*	Man's name	
Maria Pau (or Maraiba)	Woman's name (or place?_	9

(1) Classified as 'nearly *aipim*'

(7 mandiocas, 2 aipims)

(B) FISH, BIRDS AND ANIMALS

Variety Name	English	Latin Name	Total
Aipim periquita*	Parakeet 'sweet' manioc		
Mariquitinha	Type of fish (little)	*Callidulus*	
Mariquitão	Type of fish (big)	*flaviventris or Eudulus auriga*	
Voadeira	Fish similar to *tainha*	*Mugil cephalus*	4

(3 mandiocas, 1 aipim)

(C) FRUIT, PLANTS AND TREES

Variety Name	English	Latin Name	Total
Aipim abacate*	Avocado 'sweet' manioc		
Aipim abroba (or abobora)*	Pumpkin 'sweet' manioc		
Aipim cacau*	Cocoa 'sweet' manioc		
Aipim eucalipto*	Eucalyptus 'sweet' manioc		
Ataléia (1)	Tree (local synonym is *piaçaba)* Native to Bahia	*Attalea funifera*	
Cravela	Cinnamon		
Cravelão	Big cinnamon		
Cravelinha branca	Little white cinnamon		
Cravelinha preta	Little black cinnamon		
Itapicurú	Tree (from Bahian forests)	*Goniohachis marginata.*	
Landi	Tree (local synonym is *Jacareúva)*	*Callophylum brasiliense* fam. Gutiferas.	
Mandioquinha*(2)	synonymous with another root crop	*Arracacia xanthorrhiza.*	12

(1).Classified as 'nearly aipim'
(2) It is not certain that this is a manioc, despite its name. Other local name is *batata barão*
(7 mandiocas, 5 aipims)

(D) DESCRIPTIVE

Variety Name	English	Total
Aipim preta*	Black 'sweet' manioc	
Aipim rosa (or casco de queijo)*	Pink 'sweet' manioc (or cheese-skin)	
Bonitinha da praia	Pretty one from the beach	
Branca leite	Milk white	
Esgalardinha	Little branching one	
Mandioca brava	'Fierce'/poisonous manioc	
Mandiocona estupro	Rape by manioc	
Olho de Pumba	?Pidgeon eye (young leaf?)	
Olho roxo	Young leaves rusty	
Platina (or Pratinha)	Silvery	
Praianinha	Little beach one	
Vermelinha	Reddish one	12

(10 mandiocas, 2 aipims)

(E) OTHER NAMES

Variety Name	English	Total
Aipim caboquinho*	'Sweet' manioc of the little native guy (*caboclo)*	
Aipim manteiga*	Butter 'sweet' manioc	
Aipim prato cheio*	Plate full 'sweet' manioc	
Casuá	?	
Cemitério	Cemetery	
Cidade	Town	
Cidade rica	Rich town	
Cigana	Gypsy	
Cria menino	Bring up the child	
Estralo	?	
Fura chão	Dig the ground	
Inveja	Envy	
Inveja mirim	Little envy	
Jajé (or Jalé)	?	
Macumbera	from Macumba (Afro-Brazilian religious rite)	
Mata nego	Kill black man	
Milagrosa	Miracle	
Pão*	Bread	
Salagoinha	Old name (little)	
Sutinga	Old name	
Trisuma*	?Old name	
Unha	Nail or claw	22

(17 mandiocas, 5 aipims)

APPENDIX 10

THE CODIFICATION OF MANIOC DESCRIPTORS

	Sheet No.	Descriptor	Code
		LEAVES	
1.	2a	Colour of new leaf	• green 1 • reddish 3 • violet 4
2.	2b	Colour of mature leaf	• green1 • reddish 2 • violet 3
3.	2c	Shape of central lobe	After EMBRAPA 1-2 1 3-5 2 6 3 7-9 4
4.	2d	Dominant number of lobe	1 – 1 3- 2 5 – 3 7& 6 - 4 9 - 5
5.	2e	Length of lobe	average in cms.
6.	2f	Width of lobe	average in cms.
		STEMS AND PETIOLES	
7.	3a	Stem colour	• silvery - 1 • light brown - 2 • medium brown - 3 • dark brown - 4 • reddish brown - 5 • greeny-black brown -6
8.	3b	Diameter of stem	cms
9.	3c	Petiole colour	• green 1 • reddish 2 • violet 3
10.	3d	Length of petiole	cms
11.	3e	Prominence of scars on stem	• 0-0.5 cms - 1 • 0.5-1 cm 2 • 1+ cms - 3
12.	3f	Spacing of scars on stem	no. of scars in 30 cms. 1-7 - 1 7-11 – 2 11-15 3 15-19 – 4 19+ - 5
13.	3g	Branching habit	After EMBRAPA • erect – 1 • dichotomous – 2 • tricotomous – 3 • tetracotomous - 4

	Sheet No.	Descriptor	Code
14.	3h	Angle of branch to stem	0 – 1 0-30º - 2 30-45º- 3 40 - 60º - 4 60-90º - 5
15.	3i	Percentage of stems with no branches (erect)	0-20 – 1 21-40 – 2 41-60 – 3 61-80 – 4 81 - 99 – 5 100 - 6
16.	3j	Flower	no - 1 yes - 2
		THE ROOT	
17.	4a	Surface colour	• light brown - 1 • brown - 2 • orangey brown - 3 • dark brown - 4 • red-brown - 5
18.	4b	Cortex colour	• white/yellow - 1 • brown - 2 • orangey brown - 3 • reddish - 4 • violet - 5
19.	4c	Texture	• smooth - 1 • rough - 2
20.	4d	Root flesh colour	• yellow - 1 • white - 2 • cream - 3 • *manicoeira* - 4

Adapted from Emperaire (personal communication 2001) and Fukuda and Guevara , 1998.